CONTRACT NNL04AA05B
(Contract)

The following information has been determined to be exempt from disclosure and has been deleted from the contract:

- Exhibit E – Safety and Health Plan
- Exhibit F – IT Security Plan
- Section B.5 (A&B) Schedule of Rates, page 2.

The Safety and Health Plan and the IT Security Plan are replete with proprietary information. Because there are no reasonably segregable portions that are subject to release, these plans are being withheld in their entirety.

The deleted material is exempt from disclosure under
14 C.F.R. 1206.300(b)(4) which covers trade secrets and commercial or financial information obtained from a person and privileged and confidential information. It has been held that commercial or financial material is "confidential" for purposes of this exemption if its disclosure would be likely to have either of the following effects: (1) impair the Government's ability to obtain necessary information in the future; or (2) cause substantial harm to the competitive position of the person from whom the information was obtained, National Parks and Conservation v. Morton, 498 F2d 765 (D.C. Cir. 1974).

SOLICITATION, OFFER AND AWARD	1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 350) ➤	RATING C-9	PAGE 1 OF 56

2. CONTRACT NO.	3. SOLICITATION NO.	4. TYPE OF SOLICITATION	5. DATE ISSUED	6. REQUISITION/PURCHASE NO.
NNL04AA05B	NNL04-LBE-45419	☐ SEALED BID (IFB) ☒ NEGOTIATED (RFP)	2/23/04	4200045419

7. ISSUED BY	CODE	8. ADDRESS OFFER TO *(If other than Item 7)*
National Aeronautics and Space Administration **Langley Research Center** **Hampton, VA 23681-2199**		Building 1195B, Room 105 NASA Langley Research Center 9A Langley Boulevard Hampton, VA 23681-2199

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder"

SOLICITATION

9. Sealed offers in original and **8** copies for furnishing the supplies or services in the Schedule will be received at the place specified in Item 8, or if handcarried, in the depository located in **Building 1195A, Room 105** until **4:30 p.m.** local time, on **March 22, 2004.** *(date).*
CAUTION - LATE Submissions, Modifications, and Withdrawals: See Section L,. Provision No. 52.214-7 or 52.215-1. All offers are subject to all terms and conditions contained in this solicitation.

10. FOR INFORMATION CALL: ➤	A. NAME	B. TELEPHONE NO. *(NO COLLECT CALLS)*			C. EMAIL ADDRESS
		AREA CODE	NUMBER	EXT.	
	Mozetta A. Edwards	**(757)**	**864-2437**		**Mozetta.A.Edwards@nasa.gov**

11. TABLE OF CONTENTS

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OFFER *(Must be fully completed by offeror)*

NOTE: Item 12 does not apply if the solicitation includes the provisions at 52.214-16, Minimum Bid Acceptance Period.

12. In compliance with the above, the undersigned agrees, if this offer is accepted within calendar days *(60 calendar days unless a different period is inserted by the offeror)* from the date for receipt of offers specified above, to furnish any or all items upon which prices are offered at the price set opposite each item, delivered at the designated point(s), within the time specified in the schedule.

13. DISCOUNT FOR PROMPT PAYMENT ➤ *(See Section I, clause No. 52-232-8)*	10 CALENDAR DAYS %	20 CALENDAR DAYS %	30 CALENDAR DAYS Net 30 %	CALENDAR DAYS %

14. ACKNOWLEDGMENT OF AMENDMENTS *(The offeror acknowledges receipt of amendments to the SOLICITATION).* For offerors and related documents numbered and dated:	AMENDMENT NO	DATE	AMENDMENT NO	DATE
	1 through 4	April 9, 04		

15. NAME AND ADDRESS OF OFFEROR	CODE	FACILITY	16. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER *(Type or print)*
	Mainthia Technologies, Inc., 7055 Engle Road, Suite 502 Cleveland, OH 44130		**Hermant Mainthia, President**

15B. TELEPHONE NO. *(Include area code)*	15C. CHECK IF REMITTANCE ADDRESS IS DIFFERENT FROM ABOVE – ENTER ☐ SUCH ADDRESS IN SCHEDULE	17. SIGNATURE	18. OFFER DATE

AWARD *(To be completed by Government)*

19. ACCEPTED AS TO ITEMS NUMBERED	20. AMOUNT	21. ACCOUNTING AND APPROPRIATION
	Not To Exceed $9,950,000	4200045419/4200056647

22. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION ☐ 10 U.S.C. 2304(c) ( ) ☐ 41 U.S.C. 253(c) ( )	23. SUBMIT INVOICES TO ADDRESS SHOWN IN: ➤ *(4 copies unless otherwise specified)*	ITEM

24. ADMINISTERED BY *(If other than Item 7)*	CODE	25. PAYMENT WILL BE MADE BY	CODE
		NASA Langley Research Center **MS 175/Accounts Payment & Employee Services Branch** **Hampton, VA 23681**	

26. NAME OF CONTRACTING OFFICER *(Type or print)*	27. UNITED STATES OF AMERICA	28. AWARD DATE
David H. Jones	*(Signature of Contracting Officer)*	**4/26/04**

IMPORTANT – Award will be made on this Form, or on Standard Form 26, or by other authorized official written notice.

PART I - THE SCHEDULE

SECTION B - SUPPLIES OR SERVICES AND PRICE/COSTS

B.1 SUPPLIES AND/OR SERVICES TO BE FURNISHED (LaRC 52.211-90) (MAY 1999)

The Contractor shall provide all resources (except as may be expressly stated in this contract as furnished by the Government) necessary to perform the requirements delineated in the Description/ Specifications/Statement of Work.

Contract Line Item Number (CLIN) 01 - Section C, Parts 2.0 Inspection and Construction Support, 4.0 Maintenance Services Quality Assurance, and 6.0 Engineering Design Evaluation, will be indefinite delivery/indefinite quantity type. The Government will order deliveries and performance under this CLIN by issuance of cost-plus-fixed fee Task Orders (TOs), pursuant to Item B.7 below, Task Ordering Procedure (NFS 1852.216-80).

CLIN 02 - Section C, Sections 3.0 Facility/Central Utility Operations Quality Assurance Evaluation, 5.0 Instrument Services Quality Assurance, 7.0 Information Technology Evaluation, and 8.0 Financial Cost Evaluation and Data Monitoring, Sections 9.0 Surveying/ Underground Utility Services, and 10.0 Elevator Inspection and Certification Services will be indefinite delivery/indefinite quantity type. The Government will order deliveries and performance under this CLIN by issuance of firm-fixed-price TOs pursuant to Item B.7 below, Task Ordering Procedure (NFS 1852.216-80).

B.2 FIXED PRICE, ESTIMATED COST AND FIXED FEE

(a) The total estimated cost and fixed fee for CLIN 01 will be as set forth on individual CPFF task orders.

(b) The total fixed price for CLIN 02 will be as set forth on individual firm-fixed-price task orders.

B.3 TASK ORDER FUNDING

Task Orders issued under this contract shall be funded individually as specified in each Task Order.

B.4 MINIMUM AND MAXIMUM ORDER QUANTITIES

The minimum and maximum quantities for this contract are $500,000 and $9,950,000 respectively.

B.5 SCHEDULE OF RATES

(a) The Government will issue cost-plus-fixed fee task orders under this contract using the fully burdened labor rates (excluding fee) set forth below:

Schedule of Rates for Cost Plus Fixed Fee Task Orders

Position	Labor Rates								Contract Mod	
	First Year		Second Year		Third Year		Fourth Year		Fifth Year	
	Regular	Overtime	Regular	Overtime	Regular	Overtime	Regular	Overtime	Regular	Overtime
Construction Manager/Engineer	[redacted]									
Software Quality Assurance Specialist										
Inspection Supervisor/Estimator										
Construction Inspectors										
Quality Assurance Evaluators										
Surveyors										
Radiograph Monitor										
Task Order Administrative Secretary										
Accounting Clerk										
Elevator Inspector										

Schedule of Rates for Cost Plus Fixed Fee Task Orders

Non-Labor Related Indirect Rates

Cost Element	Unit	Rate Per Unit (%)
Material Costs	Direct Labor Dollars	[redacted]
Subcontract Costs	Dollars	
ODC (Other than Material & Subcontract Costs	Direct Labor Dollars	

(b) The Government will issue firm fixed price task orders under this contract using the fully burdened labor rates (excluding profit) set forth below:

Schedule of Rates for Fixed Price Task Orders

Position	Labor Rates								Contract Mod	
	First Year		Second Year		Third Year		Fourth Year		Fifth Year	
	Regular	Overtime	Regular	Overtime	Regular	Overtime	Regular	Overtime	Regular	Overtime
Construction Manager/Engineer	[redacted]									
Software Quality Assurance Specialist										
Inspection Supervisor/Estimator										
Construction Inspectors										
Quality Assurance Evaluators										
Surveyors										
Radiograph Monitor										
Task Order Administrative Secretary										
Accounting Clerk										
Elevator Inspector										

Schedule of Rates for Fixed Price Task Orders

Non-Labor Related Indirect Rates

Cost Element	Unit	Rate Per Unit (%)
Material Costs	Direct Labor Dollars	[redacted]
Subcontract Costs	Dollars	
ODC (Other than Material & Subcontract Costs	Direct Labor Dollars	

B.6 PROFIT AND FEE ON TASK ORDERS

Individual Firm Fixed Price or Cost Plus Fixed Fee Task Orders will be negotiated as a result of proposals submitted for each Task Order. Proposed profit or fee on each order will also be negotiated using the NASA Structured Profit and Fee approach described in the NASA FAR SUP 1815.404-470. In no case shall profit or fixed fee exceed the statutory limits in FAR 15.404-4. A reasonable profit or fixed fee may be accepted without discussions. The profit or fixed fee rate accepted or negotiated for the initial requirement under any specific Task Order will be the maximum rate applied to all change or modification actions involving work not previously specified in the Task Order. Cost in addition to the original contractor estimate on Cost Plus Fixed Fee orders shall not result in additional fee unless the Contracting Officer determines that fee is justified. Fixed Priced Task Orders shall be completed for the price, inclusive of profit, unless changed by the Contracting Officer.

B.7 TASK ORDERING PROCEDURE (NFS 1852.216-80) (October 1996)

(a) Only the Contracting Officer may issue task orders to the Contractor, providing specific authorization or direction to perform work within the scope of the contract and as specified in the schedule. The Contractor may incur costs under this contract in performance of task orders and task order modifications issued in accordance with this clause. No other costs are authorized unless otherwise specified in the contract or expressly authorized by the Contracting Officer.

(b) Prior to issuing a task order, the Contracting Officer shall provide the Contractor with the following data:

(1) A functional description of the work identifying the objectives or results desired from the contemplated task order.

(2) Proposed performance standards to be used as criteria for determining whether the work requirements have been met.

(3) A request for a task plan from the Contractor to include the technical approach, period of performance, appropriate cost information, and any other information required to determine the reasonableness of the Contractor's proposal.

(c) Within 10 calendar days after receipt of the Contracting Officer's request, the Contractor shall submit a task plan conforming to the request.

(d) After review and any necessary discussions, the Contracting Officer may issue a task order to the Contractor containing, as a minimum, the following:

(1) Date of the order.

(2) Contract number and order number.

(3) Functional description of the work identifying the objectives or results desired from the task order, including special instructions or other information necessary for performance of the task.

(4) Performance standards, and where appropriate, quality assurance standards.

(5) Maximum dollar amount authorized (cost and fee or price). This includes allocation of award fee among award fee periods, if applicable.

(6) Any other resources (travel, materials, equipment, facilities, etc.) authorized.

(7) Delivery/performance schedule including start and end dates.

(8) If contract funding is by individual task order, accounting and appropriation data.

(e) The Contractor shall provide acknowledgment of receipt to the Contracting Officer within 7 calendar days after receipt of the task order.

(f) If time constraints do not permit issuance of a fully defined task order in accordance with the procedures described in paragraphs (a) through (d), a task order which includes a ceiling price may be issued.

(g) The Contracting Officer may amend tasks in the same manner in which they were issued.

(h) In the event of a conflict between the requirements of the task order and the Contractor's approved task plan, the task order shall prevail.

[END OF SECTION]

SECTION C - DESCRIPTION/SPECIFICATION/WORK STATEMENT

NOTE: WORKLOAD DATA FOR PROPOSAL PREPARATION IS LOCATED IN ATTACHMENT 3

1.0 INTRODUCTION AND SCOPE

The Inspection and Quality Assurance (IQA) Contract includes a variety of inspection and quality assurance support services to ensure Langley Research Center's (LaRC) facilities and institutional infrastructure are and maintained in accordance with the standards of quality that are specified through contracts and facility management programs. The IQA contract personnel will provide review and data collection of other LaRC contractor's performance to ensure that Langley's facilities are operated, maintained and engineered in accordance with NASA and LaRC mandates, specifications, and contract requirements.

The IQA Contractor will provide support to the Government in monitoring its numerous contracts for construction, maintenance and operation of facilities, including all activities of the Research Operations, Maintenance, Engineering (ROME) Contract and all facility or research related construction projects. While the majority of work directly supports LaRC on-site, other industry partners and Government agencies may occasionally be supported. The Contractor shall furnish all personnel, training, equipment, materials, transportation, and management (except as specified in this contract) necessary to perform the following:

a) Construction contract inspection and construction contract management support services required to ensure compliance with applicable specifications and contract terms and conditions
b) Surveying and underground utility services, including engineering drafting services
c) Quality assurance review of research and central utilities facilities operations procedures and documentation
d) Support the Government in the verification and inspection of research and institutional facility maintenance, repair, modification, construction and system development
e) Support the Government in the verification of documentation and instrumentation calibration and repair, including instrumentation metrology and data systems maintenance and documentation
f) Constructability and maintainability reviews of proposed research systems and institutional facility engineering designs and maintenance changes
g) Support the Government in the review and assessment of contractor proposed construction and maintenance costs
h) Support the Government in the evaluation of Operations, Maintenance, and Engineering (OME)-related information technology (IT) services including administration, planning, development, maintenance, and project management and deployment
i) Weld joint evaluation and welding X-ray monitoring operations
j) Independent inspection and certification of elevator equipment
k) Support the Government in financial and labor data tracking/ monitoring of maintenance contracts

1.1 Facilities

The Government will provide on-site office space for IQA Contractor inspection and quality assurance employees as needed to perform the specified tasks. In addition, the Government will provide a maximum of 325 sq. ft. of on-site office space for contract management personnel. Facility requirements beyond these limitations shall be at the Contractor's expense. The Contractor shall furnish all applicable office supplies, equipment, IT computing equipment and services necessary for contract personnel to complete all contract requirements. The Contractor shall provide all inspection or quality assurance evaluators with the capability to communicate electronically for independent transfer of documentation data and inspection results. The Contractor shall provide employees with IT systems that will be compatible with existing LaRC networks and business systems. The Contractor shall provide construction inspection employees with radio and/or wireless communications equipment, which shall be used only upon receipt of necessary approvals and FCC licenses, and frequencies for the equipment in accordance with LAPG 2570.5, *FCC Radio Frequency Spectrum Management* (if applicable).

1.2 Qualifications

The Contractor shall demonstrate and implement innovative and cost-effective management systems, processes, and initiatives to achieve the specific contract task requirements while meeting all Statement of Work (SOW) requirements and performance standards.

1.2.1 Worker Qualifications

The Contractor shall supply and administer a flexible, competent, and qualified staff, integrated appropriately across all areas of the contract in order to fully support and accomplish the requirements. Subcontractors and/or teaming arrangements shall be fully integrated in the Contractor's management structure. The Contractor shall ensure all personnel are qualified on the basis of appropriate educations, training, experience, and certification to perform assigned tasks, accomplishing safety critical operations in compliance with regulatory requirements and in accordance with site-specific standards and procedures (e.g. Construction Inspector). The degree of skill of individuals shall be commensurate with that required for the work. See Exhibit H, Worker Qualifications, for selected worker qualification requirements.

1.2.2 LaRC Specific Training and Certifications

Selected Contractor employees performing designated evaluations or inspections will be required to complete the following applicable certifications:

a) Safety training: Safety training and certifications are specified in LAPG 1740.6, *Personnel Safety Certification,* and LAPG 1710.10, *Safety Clearance Procedures (Lockout/Tag).* Examples include Safety Operator, Ionizing Radiation Worker, Hazardous Material, and High Worker. The Contractor shall issue

safety certifications in accordance with LAPG 1740.6. However, the Contractor shall provide Safety Operator Field Certifiers to field certify safety operator candidates in accordance with LAPG 1710.10 within six months from the effective date of the contract.

b) Operational training: This training may include all training related to operations (wind tunnel or utilities). Operational training includes, but is not limited to, process, procedures, and institutional equipment safety training. Wind-tunnel operational training includes facility configuration, operation, test or test technique training. Facility specific technical topics that shall be addressed in an operational training program will be identified by the Government prior to issuance of the task.

c) Certification or qualification training: This training may include all training required to obtain/maintain a process or personnel certification/qualification. Process certifications and qualifications are specified in LAPG 1740.7, *Process Systems Certification Program*. Certification, when required, shall verify that individuals possess the competencies, skills, and experience pertinent to their work assignment and that those workers demonstrate a working knowledge of the laws, regulations, and NASA directives pertinent to their tasks.

1.2.3 Contractor Licenses and Certifications

The Contractor shall obtain and submit to the Contracting Officer (CO) all licenses required to conduct business (e.g. local or state business licenses) prior to beginning work on this contract. All licenses and certifications shall be kept current throughout the contract period.

1.3 General Requirements

1.3.1 Contractor Interfaces

The Contractor shall interface with a wide variety of Center personnel, both contractor and civil servant, in meeting contract requirements and providing documentation to CO, Contracting Officer's Technical Representatives (COTR), and responsible Government officials.

1.3.2 Availability of Utilities

The Government will furnish the utility services including electricity, data and voice communications, potable water, sewage and refuse collection at existing outlets for the Contractor's use in those facilities provided by the Government for the work performed under the contract. The Contractor shall use Government furnished telephone and electronic data connections for official contract business only. The Government will provide internal mail service.

1.3.3 Hours of Operation

Normal business hours at NASA LaRC are 6:00 a.m. to 6:00 p.m. Monday through Friday, except for federal holidays. NASA program requirements and testing commitments will dictate the Contractor's work hours and, in emergency situations, may include 24-hour, 7 days per week operations.

1.3.4 Task Orders

The CO will issue Task Orders (TOs) for tasks described in Sections 2.0 through 10.0 of this SOW. TOs may contain a variety of subtasks within them. The Contractor shall track and report individual costs of subtasks to the Government. TOs will be issued using the Langley Standard Form No. 322 (See Exhibit I.)

1.3.5 Communication

The Contractor shall participate in regular status meetings with the designated Government officials at intervals that are mutually acceptable, but at least monthly. At the meetings, the Contractor shall provide a written status on all contract activities and tasks.

1.3.6 Reports and Submittals for Task Orders

The Contractor shall deliver all reports and submittals to the COTR with one signed original document and one copy in electronic format. All required reports and submittals will be specified in each TO.

2.0 INSPECTION AND CONSTRUCTION SUPPORT

The Contractor shall perform inspection services for construction contracts as well as construction management support for construction contracts and subcontracts at LaRC, as directed by the Government-issued TOs.

2.1 Construction Inspection Support

The Contractor shall provide multidisciplinary inspection services for construction contracts that are generated from designs developed under other contracts, and in-house (LaRC) generated designs. The value of LaRC construction contracts is estimated at $20M/year. The Contractor shall furnish inspection services including, but not limited to, inspection of: site preparation, foundation, masonry, structural steel, interior wall partitions, metal work, pipefitting, floors, doors, mechanical systems, roofing, electrical systems (power and controls), welding (including high pressure systems, LAPG 1710.40 *Safety Regulations covering Pressurized Systems*), wind tunnel model injection and control systems, wind tunnel modifications, painting and coating systems, heating, ventilation, and air conditioning systems. Other construction services include but are not limited to: pre-award/pre-construction services (i.e., site visit attendance, kickoff meeting attendance), construction contract administration support and technical consultation.

Inspection services shall be provided at locations both on and off site and shall verify construction-contractor compliance with contract requirements. Construction inspectors shall inspect, check and witness, prepare logbooks, refer to submittals, issue deficiency notices (non-compliance), conduct wage surveys, attest to the reasonableness of progress payments and coordinate construction - contractor activities which interface with ongoing NASA activities. Inspectors shall coordinate construction-contractor requested digging permits, utility outages and other miscellaneous services deemed necessary to complete the assigned task.

The Contractor shall notify construction contractors and the IQA COTR of any contract deviation.

The Contractor shall provide a written noncompliance report for any deviation not corrected.

If, during the course of inspection, the Contractor becomes aware of deviations from building codes, laws, or NASA regulations in the construction contract documents, the Contractor shall notify the COTR for that specific construction contract as well as the IQA COTR.

The Contractor shall provide radiographic monitoring services for the nondestructive testing (NDT) of welds, castings, and piping. The Contractor shall establish boundaries and maintain a record of the time, location, and radiation levels measured at representative locations on the critical area boundary. The Contractor shall comply with the NDT requirements and procedures listed in LAPG 1710.5 *Ionizing Radiation*.

In addition to technical onsite inspection, the Contractor shall maintain a system of records and logs by individual TO and sub-TO, which attests that the work was performed as specified. When specified by TO, the Contractor shall field verify the accuracy of construction contractor-maintained as-built drawings.

The Contractor shall become familiar with the LaRC safety clearance procedures listed in LaRC Handbook LAPG 1710.10 *Safety Clearance Procedures (Lockout/Tagout)*. Applicable IQA personnel shall attend NASA-provided training and be certified in the installation and removal of the red "DO NOT OPERATE" safety tags in accordance with the safety clearance procedures. The Contractor shall ensure that such personnel remain properly certified to accomplish the required tagging operations. These services shall only be provided for construction contracts being inspected by the Contractor. Approximately 95% of the inspection TOs will require this red tag service.

During walk-through inspections for construction contracts, the Contractor shall prepare a list of remaining construction contract requirements to be accomplished. A copy of this list shall be provided to the construction contract COTR or the ROME construction manager.

For a more detailed summary of required inspection services in this SOW, consult the NASA LaRC Construction Inspection Manual dated January 24, 2000 provided in Exhibit J. The Government will use an

Inspection Menu of Services Form, LF 251 (Exhibit K) to document inspection requirements of the TOs.

All inspection documentation will be subject to periodic review by the Government.

2.2 Construction Management Support

The Contractor shall perform construction management support services for LaRC construction projects. These services will include support of LaRC project managers during the pre-construction and construction phases by reviewing and making appropriate recommendations regarding: contract specifications and drawings prior to the package going to the LaRC Office of Procurement, submittals, schedules, cost estimates, construction contractor performance, engineering changes, tests, and test plans. When requested, the Contractor shall review construction, repair, and replacement cost proposals from other contractors to support validation of a fair and reasonable cost for the scoped work. Contractor shall, when required, prepare new or revised construction drawings to support new requirements or changes to existing requirements for contracts. Construction drawings shall be prepared and revised in accordance with Exhibit L, LaRC Building Layering Convention and Exhibit M, Mechanical Drafting Standards.

The Contractor shall provide contract administration support which may include evaluation of contractor Requests For Information (RFIs), progress/payment reviews, contract documentation and correspondence review required for effective contract administration and evaluation of other contractor claims. The Contractor shall prepare and/or review construction and contract change order estimates, review and attest to the reasonableness of construction completion schedules, and attest to the reasonableness of progress payment requests.

The Contractor shall develop, maintain, and provide the Government with an electronic construction management database containing both construction contract data and cost accounting of construction management and inspection hours charged to each construction contract/task order.

The Contractor, when required, shall perform constructability, maintainability and cost reviews of changes to contracts of proposed research and institutional facility and systems engineering designs or maintenance changes.

For a more detailed summary of required construction management services in this SOW, consult Sections 3 and 4 and appropriate Appendices of the Facility Systems Engineering Division Construction Management Manual dated November 29, 2000 (Exhibit N). The Government will use Construction Management Services Form, LF 252 (Exhibit O) to document requirements of the TOs.

3.0 FACILITY/CENTRAL UTILITY OPERATIONS QUALITY ASSURANCE EVALUATION

Operations at LaRC involve both research facilities, such as wind tunnels and laboratories, and central utilities, such as the production and/or distribution of steam, high-pressure air, electricity, potable water, sanitary sewer, and natural gas. The Government will issue specific TOs for facility operations evaluations to provide data and documentation on the ROME Contractor performance. The Contractor shall support the Government in developing and establishing criteria and metrics used to evaluate each facility operation as each facility/utility is transitioned into the ROME Contract. The TOs will establish basic procedures for the performance evaluations and all required deliverables to the Government.

4.0 MAINTENANCE SERVICES QUALITY ASSURANCE

Facility and facility system maintenance at LaRC involves all activities necessary to insure that LaRC facilities and facility systems are safe, fully operational, reliable and available on demand. LaRC facility maintenance is reliability centered, includes Preventive Maintenance (PM), facility and system repairs, Inspection Measurement and Test Equipment (IM&TE), Data Acquisition Systems (DAS) maintenance and repair, Facility Automation Systems (FAS) maintenance and repair, and maintenance projects.

The Contractor shall provide quality assurance evaluation services for maintenance, repair, and construction activities performed on LaRC facilities. Maintenance, repair, and reliability centered maintenance construction activities include management, trouble calls, recurring work, and non-recurring (IQ) work performed by the ROME Contractor and subcontractors. The Contractor shall inspect, check and witness, collect performance metric data, prepare documentation and reports, and participate in performance review meetings to support LaRC's Quality Assurance Program. The Government will issue specific TOs for facility and system maintenance evaluations to provide data and documentation on the ROME Contractor performance. The Contractor shall support the Government in developing and establishing criteria and metrics used to evaluate facility and facility systems maintenance. The TOs will establish basic procedures for the performance evaluations and all required deliverables to the Government.

5.0 INSTRUMENT SERVICES QUALITY ASSURANCE

The Contractor shall provide quality assurance review of documentation of repairs, modifications, calibrations, and maintenance on Inspection Measurement and Test Equipment (IM&TE) to assess the ROME Contractor's compliance. Of the approximately 80,000 instruments, approximately 5,000 are classified as Category 1 (used daily and calibrated periodically), approximately 15,000 are classified as Category 2 (used infrequently and calibrated before use, unless a valid calibration date is indicated on the instrument), and approximately 60,000

instruments are maintained in reserve for use when required. The Government will issue specific TOs for instrument services quality assurance evaluations to provide data and documentation on the ROME Contractor performance. The Contractor shall support the Government in developing and establishing criteria and metrics used to evaluate instrument services quality assurance. The TOs will establish basic procedures for the performance evaluations and all required deliverables to the Government.

6.0 ENGINEERING DESIGN EVALUATION

Engineering design evaluation consists of a wide variety of engineering services and related cost evaluations for independent validation of proposed project cost. The Contractor, when required, shall develop independent cost estimates to perform cost, constructability, and maintainability reviews of proposed research systems and institutional facility engineering designs or maintenance changes. The Contractor shall support development of estimates, alternate designs or approaches for planning and budgeting. The Contractor, when required, shall support the Government by attending design reviews, developing or responding to action items and evaluating responses to action items identified during reviews. The Government will issue a specific TO for evaluation of designs and cost.

7.0 INFORMATION TECHNOLOGY EVALUATION

Information Technology (IT) is the set of multiple applications, infrastructure hardware and software components, documents, and customer services that support the OME business processes and customers. The Government will issue specific TOs for IT quality assurance reviews/audits to provide data and documentation on the ROME Contractor practices and software products. The TOs will establish basic procedures for the reviews and audits and all required deliverables to the Government.

The Contractor shall support the Government in identifying metrics and acceptance criteria to demonstrate achievement of quality of the delivered product.

The Contractor shall work with the ROME contractor during the early stages of software development to establish plans and procedures that will add value to the software project and satisfy the constraints of the project and LaRC's policies.

The Contractor shall develop, document, implement and maintain a software quality assurance plan in accordance with LMS-CP-4754, Quality Assurance (QA) for Software Development and Acquisition. The Contractor shall provide software quality assurance by reviewing and auditing the software products and processes developed in the ROME contract to verify compliance with the applicable procedures, plans and standards.

8.0 FINANCIAL COST EVALUATION AND DATA MONITORING

The Contractor shall provide financial cost data monitoring to support evaluation of the ROME Contractor's costing, small business, and cost savings metrics. The Contractor shall monitor, and review specific IDIQ costs to validate original proposal and completion costs. The Government will issue specific TOs for cost evaluation and cost data monitoring documentation on the ROME Contractor performance. The Contractor shall support the Government in developing and establishing databases used to evaluate cost performance. The TOs will establish basic procedures for the evaluations and all required deliverables to the Government.

9.0 SURVEYING/UNDERGROUND UTILITY SERVICES

The Contractor shall provide surveying services for facility construction and research projects at LaRC using both conventional and Global Positioning System (GPS) technologies in Geographic Information System (GIS) environment. Services will include surveying both the East Area of LaRC [located on Langley Air Force Base (LAFB)] and the West Area of LaRC. At least one member of the Contractor's surveying team shall be a Virginia licensed surveyor with at least one (1) year of GIS experience.

The Contractor shall attend a weekly meeting at LAFB to discuss surveying requirements and coordination of work at the East Area of LaRC. Surveying services shall be initiated by customers calling an existing phone number staffed by the Contractor to request services. The Contractor shall log all service requests and their status in electronic format on the Government's server.

9.1 Surveying: Facility Construction and Research Projects

The Contractor shall perform surveying services in support of facility construction and research projects with conventional and GPS survey equipment. Accuracy requirements are $\pm$ 0.01 ft. for construction surveys and $\pm$ 0.005 ft. for machinery and research equipment.

9.2 Surveying: Digging Projects

The Contractor shall perform surveying work in the field for locating and marking existing underground utilities to preclude damage during digging projects for construction and maintenance activities (Reference Digging Permits in LAPG 1740.2, *Facility Safety Requirements*). The primary purposes of this surveying work are to ensure human safety and to prevent interruption of LaRC and LAFB services. The utility marking shall be thorough and accurate. Accuracy requirements for marking utilities shall be $\pm$ 1.0 ft. in the horizontal plane and $\pm$ 0.5 ft. in the vertical plane. Accuracy is measured by comparing the actual location of exposed utilities to the Contractor's markings. The Contractor shall report to the specified site location for emergency digging permit requests (e.g. broken water lines) within 15 minutes of notification during normal working hours.

Occasionally (2 to 4 times per year), emergency survey support for digging permits is required during weekends or outside normal working hours. The Contractor shall respond within 2 hours for these requests. The Contractor shall implement technology improvements (software) for electronic in-field display of reference data by the end of the first contract year. The Contractor shall submit a Project Management Plan, in accordance with LMS-OP-5689, *Facility Systems Engineering Project Management Plan Development,* that addresses use/display of vector, raster, and attribute data from the Facility Utility Electronic Database/Geographical Information System (FUED/GIS) using a portable Global Positioning System/Optical Total Station (GPS/OTS) data collection/display device. The plan shall address absolute positioning based on Real Time Kinematics (RTK) GPS to complement or replace interpretation of hardcopy drawings for utility marking. The Contractor shall implement this plan upon approval by the CO.

9.3 Surveying: Spatial Data Maintenance Guidelines

The Contractor shall perform survey and spatial data maintenance in accordance with Appendix 2.1, *Surveying: Spatial Data Maintenance Guidelines,* and the Appendix 2.2, *Geospatial Positioning Accuracy Standards,* at the following website:

).

Guidelines for GIS drawing work shall be in accordance with the Standards and Procedures for Facilities and Utilities Electronic Database (FUED) (Exhibit P).

9.4 Surveying: Underground Utility Database Updates/As-Built Records

The Contractor shall update and maintain NASA LaRC underground utility spatial data sets contained in the Facility Utility Electronic Database (FUED) to reflect the as-built configuration in accordance with the Digging Permit Procedure (LAPG 1740.2, *Facility Safety Requirements*). The Contractor shall obtain and record as-built information in the GIS underground utility database, during and after construction, of above and below grade utilities. The Contractor shall conduct field measurements to determine horizontal and vertical positions of above and below grade utilities, structures and topographic features. All as-built records shall become the property of the Government and shall be delivered to the CO within five (5) working days of construction completion, and thereafter, within one (1) working day of any request by the CO. The Contractor shall maintain capability to print and provide the Government copies in the standard sheet sizes A-E. The Contractor shall coordinate with the construction inspectors and other construction-contractors to ensure that as-built information for all new below-grade utilities is recorded prior to backfill. Relative accuracy requirements for determining as-built records shall be $\pm$ 0.25 ft. for horizontal location and $\pm$ 0.10 ft. for vertical location (elevation) of below grade utilities, and $\pm$ 0.05 ft. in both planes for structures and topographic features. NASA LaRC will provide the underground utility data and supporting as-built files at contract startup. The Contractor shall be responsible for the accuracy and completeness of all subsequent updates/revisions to NASA-LaRC underground utility

data. This data is currently managed in AutoDesk AutoCAD Map Version 6 and upon completion of the GIS implementation (scheduled FY04), shall be managed in Environmental System Research Institute (ESRI) ArcSDE 8.2 (or later) format. The Contractor's field notes and other as-built information shall be added to the NASA-LaRC as-built files and returned to the NASA-LaRC Underground Utilities Coordinator with the as-built files at contract completion. The Government will provide the contractor with two desktop workstations for the sole purpose of maintaining the FUED data. All surveying data and FUED drawings shall be maintained on Government servers.

9.5 Global Position System Equipment

The Contractor shall use the LaRC provided RTK correction signal. LaRC GPS RTK Base Station broadcasts from the top the LaRC Hangar (Building 1244) and Engineering (Building 1209), which is less than 4 KM to any LaRC/LAFB feature. The LaRC GPS RTK operates on 464.5 MHz using Trimble eRTK Compact Measurement Record (CMR +) differential correction protocol. At the effective date of the contract, the Government will furnish a rover RTK GPS/OTS system and other systems to support static measurement. The Government will furnish and maintain GPS surveying equipment to the Contractor for this work.

10.0 ELEVATOR INSPECTION AND CERTIFICATION

The Contractor shall provide independent inspection and elevator code compliance certification for all personnel and equipment elevators on LaRC. Personnel with NAESA Qualified Elevator Inspector (QEI) certification and who are licensed by the State of Virginia to perform elevator certification inspections shall provide the services. Inspections shall be performed, at a minimum, annually. A current list of the elevators to be inspected is attached as Exhibit Q.

[END OF SECTION]

SECTION D - PACKAGING AND MARKING

D.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: The following contract clauses pertinent to this section are hereby incorporated by reference:

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE

None included by reference.

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

CLAUSE NUMBER	DATE	TITLE

None included by reference.

[END OF SECTION]

SECTION E - INSPECTION AND ACCEPTANCE

E.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: The following contract clauses pertinent to this section are hereby incorporated by reference:

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE
52.246-4	AUG 1996	INSPECTION OF SERVICES--FIXED-PRICE (CLIN 02 ONLY)
52.246-5	APR 1984	INSPECTION OF SERVICES--COST-REIMBURSEMENT (CLIN 01 ONLY)

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

CLAUSE NUMBER	DATE	TITLE

None included by reference.

[END OF SECTION]

SECTION F - DELIVERIES OR PERFORMANCE

F.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: The following contract clauses pertinent to this section are hereby incorporated by reference:

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE
52.242-15	AUG 1989	STOP-WORK ORDER (ALTERNATE I) (APR 1984) (CLIN 01 ONLY)
52.247-34	NOV 1991	F.O.B. DESTINATION

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

CLAUSE NUMBER	DATE	TITLE
None included by reference.		

F.2 PERIOD OF PERFORMANCE

a. The period of performance for SOW sections 2.0 through 8.0 and SOW Section 10.0 shall be 60 months from the effective date of the contract.

b. The period of performance for SOW section 9.0 (Surveying/ Underground Utility Services) shall commence on or about August 21, 2004. Thereafter, the period of performance completion shall coincide with item a. above.

F.3 PLACE(S) OF PERFORMANCE (LaRC 52.211-98) (OCT 1992)

The place(s) of performance shall be:

NASA, Langley Research Center, Hampton, Virginia; and other sites as may be designated by the Contracting Officer.

[END OF SECTION]

SECTION G - CONTRACT ADMINISTRATION DATA

G.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: The following contract clauses pertinent to this section are hereby incorporated by reference:

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE
None included by reference.		

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

CLAUSE NUMBER	DATE	TITLE
1852.223-71	DEC 1988	FREQUENCY AUTHORIZATION
1852.242-73	JUL 2000	NASA CONTRACTOR FINANCIAL MANAGEMENT REPORTING (CLIN 01 ONLY)

G.2 SUBMISSION OF VOUCHERS FOR PAYMENT (NFS 1852.216-87) (MAR 1998) (CLIN 01 ONLY)

(a) The designated billing office for cost vouchers for purposes of the Prompt Payment clause of this contract is indicated below. Public vouchers for payment of costs shall include a reference to the number of this contract.

(b) (1) If the contractor is authorized to submit interim cost vouchers directly to the NASA paying office, the original voucher should be submitted to:

NASA Langley Research Center
MS 175/Accounts Payable & Employee Services Branch
Hampton VA 23681

(2) For any period that the Defense Contract Audit Agency has authorized the Contractor to submit interim cost vouchers directly to the Government paying office, interim vouchers are not required to be sent to the Auditor, and are considered to be provisionally approved for payment, subject to final audit.

(3) Copies of vouchers should be submitted as directed by the Contracting Officer.

(c) If the contractor is not authorized to submit interim cost vouchers directly to the paying office as described in paragraph

(b), the contractor shall prepare and submit vouchers as follows:

(1) One original Standard Form (SF) 1034, SF 1035, or equivalent Contractor's attachment to the Contractor's cognizant DCAA office:

(2) Four copies of SF 1034, SF 1035A, or equivalent Contractor's attachment to the following offices by insertion in the memorandum block of their names and addresses:

(i) Copy 1 NASA Contracting Officer
(ii) Copy 2 Auditor
(iii) Copy 3 Contractor
(iv) Copy 4 Contract administration office

(3) The Contracting Officer may designate other recipients as required.

(d) (1) Public vouchers for payment of fee shall be prepared similarly to the procedures in paragraphs (b) or (c) of this clause, whichever is applicable, and be forwarded to:

NASA Langley Research Center
MS 175/Accounts Payable & Employee Services Branch
Hampton VA 23681

This is the designated billing office for fee vouchers for purposes of the Prompt Payment clause of this contract.

(2) Fixed fee shall be paid in monthly installments based upon the percentage of completion of work as determined by the Contracting Officer. The following formulas are provided as a convenience for calculating the interim fee provided the formulas produce a reasonable percentage as compared to completion of work. You should show both formulas on your fee voucher, however, the maximum fee percentage for fee billing is the smaller of the percentages resulting from the application of the two formulas. If at any time the Contracting Officer determines that the fee percentage is not concert with the completion of work, the fee formula will be adjusted, or another methodology that results in comparative fee billing agree upon.

(#) Cost Incurred to Date

Task Order Estimated Cost = ___%

(#) Months of Performance Expended to Date

Task Order Period of Performance (Months) = ___%

(e) In the event that amounts are withheld from payment in accordance with provisions of this contract, a separate voucher for the amount withheld will be required before payment for that amount may be made.

G.3 SUBMISSION AND PAYMENT OF VOUCHERS (CLIN 02 ONLY)

Task Orders placed on a fixed price basis will be paid as follows:

1. Public vouchers for fixed price Task Orders shall include a reference to this Contract Number and the Task Order Number. The Contractor's taxpayer identification number shall be included on the invoice.

2. Payment for Fixed Price Task Orders for less than $5,000 will be made after completion of all Task Order requirements. Partial payments may be authorized. Payments for Task Orders $5,000 or more will be made on a monthly basis.

G.4 TECHNICAL DIRECTION (NFS 1852.242-70) (SEP 1993)

(a) Performance of the work under this contract is subject to the written technical direction of the Contracting Officer Technical Representative (COTR), who shall be specifically appointed by the Contracting Officer in writing in accordance with NASA FAR Supplement 18-42.270. "Technical direction" means a directive to the Contractor that approves approaches, solutions, designs, or refinements; fills in details or otherwise completes the general description of work or documentation items; shifts emphasis among work areas or tasks; or furnishes similar instruction to the Contractor. Technical direction includes requiring studies and pursuit of certain lines of inquiry regarding matters within the general tasks and requirements in Section C of this contract.

(b) The COTR does not have the authority to, and shall not, issue any instruction purporting to be technical direction that--

(1) Constitutes an assignment of additional work outside the statement of work;

(2) Constitutes a change as defined in the changes clause;

(3) Constitutes a basis for any increase or decrease in the total estimated contract cost, the fixed fee (if any), or the time required for contract performance;

(4) Changes any of the expressed terms, conditions, or specifications of the contract; or

(5) Interferes with the Contractor's rights to perform the terms and conditions of the contract.

(c) All technical direction shall be issued in writing by the COTR.

(d) The Contractor shall proceed promptly with the performance of technical direction duly issued by the COTR in the manner prescribed by this clause and within the COTR's authority.

If, in the Contractor's opinion, any instruction or direction by the COTR falls within any of the categories defined in paragraph (b)

above, the Contractor shall not proceed by shall notify the Contracting Officer in writing within 5 working days after receiving it and shall request the Contracting Officer to take action as described in this clause. Upon receiving this notification, the Contracting Officer shall either issue an appropriate contract modification within a reasonable time or advise the Contractor in writing within 30 days that the instruction or direction is--

(1) Rescinded in its entirety; or

(2) Within the requirements of the contract and does not constitute a change under the changes clause of the contract, and that the Contractor should proceed promptly with its performance.

(e) A failure of the Contractor and Contracting Officer to agree that the instruction or direction is both within the requirements of the contract and does not constitute a change under the changes clause, or a failure to agree upon the contract action to be taken with respect to the instruction or direction, shall be subject to the Disputes clause of this contract.

(f) Any action(s) taken by the Contractor in response to any direction given by any person other than the Contracting Officer or the COTR shall be at the Contractor's risk.

G.5 INSTALLATION-ACCOUNTABLE GOVERNMENT PROPERTY (NFS 1852.245-71) (JUN 1998) (LaRC FILL IN)

(a) The Government property described in the clause at 1852.245-77, List of Installation-Accountable Property and Services, shall be made available to the Contractor on a no-charge basis for use in performance of this contract. This property shall be utilized only within the physical confines of the NASA installation that provided the property. Under this clause, the Government retains accountability for, and title to, the property, and the Contractor assumes the following user responsibilities:

User responsibilities in accordance with NASA Handbook NPR 4200.1, NASA Equipment Management Manual.

The contractor shall establish and adhere to a system of written procedures for compliance with these user responsibilities. Such procedures must include holding employees liable, when appropriate, for loss, damage, or destruction of Government property.

(b) (1) The official accountable recordkeeping, physical inventory, financial control, and reporting of the property subject to this clause shall be retained by the Government and accomplished by the installation Supply and Equipment Management Officer (SEMO) and Financial Management Officer. If this contract provides for the contractor to acquire property, title to which will vest in the Government, the following additional procedures apply:

(i) The contractor's purchase order shall require the vendor to deliver the property to the installation central receiving area;

(ii) The contractor shall furnish a copy of each purchase order, prior to delivery by the vendor, to the installation central receiving area:

(iii) The contractor shall establish a record of the property as required by FAR 45.5 and 1845.5 and furnish to the Industrial Property Officer a DD Form 1149 Requisition and Invoice/Shipping Document (or installation equivalent) to transfer accountability to the Government within 5 working days after receipt of the property by the contractor. The contractor is accountable for all contractor-acquired property until the property is transferred to the Government's accountability.

(iv) Contractor use of Government property at an off-site location and off-site subcontractor use require advance approval of the contracting officer and notification of the SEMO. The contractor shall assume accountability and financial reporting responsibility for such property. The contractor shall establish records and property control procedures and maintain the property in accordance with the requirements of FAR Part 45.5 until its return to the installation.

(2) After transfer of accountability to the Government, the contractor shall continue to maintain such internal records as are necessary to execute the user responsibilities identified in paragraph (a) and document the acquisition, billing, and disposition of the property. These records and supporting documentation shall be made available, upon request, to the SEMO and any other authorized representatives of the contracting officer.

G.6. LIST OF INSTALLATION-ACCOUNTABLE PROPERTY AND SERVICES (NFS 1852.245-77) (JUL 1997)

In accordance with the clause at 1852.245-71, Installation-Accountable Government Property, the Contractor is authorized use of the types of property and services listed below, to the extent they are available, in the performance of this contract within the physical borders of the installation which may include buildings and space owned or directly leased by NASA in close proximity to the installation, if so designated by the Contracting Officer.

(a) Office space, work area space, and utilities. Government telephones are available for official purposes only; pay telephones are available for contractor employees for unofficial calls.

(b) General- and special-purpose equipment, including office furniture.

(1) Equipment to be made available is listed in Exhibit A. The Government retains accountability for this property under the clause at 1852.245-71, Installation-Accountable Government Property, regardless of its authorized location.

(2) If the Contractor acquires property, title to which vests in the Government pursuant to other provisions of this contract, this

property also shall become accountable to the Government upon its entry into Government records as required by the clause at 1852.245-71, Installation-Accountable Government Property.

(3) The Contractor shall not bring to the installation for use under this contract any property owned or leased by the Contractor, or other property that the Contractor is accountable for under any other Government contract, without the Contracting Officer's prior written approval.

(c) Publications and blank forms stocked by the installation.

(d) Safety and fire protection for Contractor personnel and facilities.

(e) Installation service facilities: LaRCNET connections/network attached devices, (NAD), mail service, library.

(f) Medical treatment of a first-aid nature for Contractor personnel injuries or illnesses sustained during on-site duty.

(g) Cafeteria privileges for Contractor employees during normal operating hours.

(h) Building maintenance for facilities occupied by Contractor personnel.

(i) Moving and hauling for office moves, movement of large equipment, and delivery of supplies. Moving services shall be provided on-site, as approved by the Contracting Officer.

(j) Fuel for vehicles used in the performance of this contract.

(k) The user responsibilities of the Contractor are defined in paragraph (a) of the clause at 1852.245-71, Installation-Accountable Government Property.

G.7 PROVIDING FACILITIES TO CONTRACTORS

A. In accordance with FAR 45.302-1, it is policy of the Government that Contractors shall furnish all facilities required for performing Government contracts. "Facilities" include real property and plant equipment including personal property such as general purpose off-the-shelf equipment, machine tools, test equipment, furniture and vehicles. "Facilities" do not include material, special test equipment, special tooling or agency-peculiar property.

B. In keeping with the policy set forth in FAR 45.302-1, the Government will not provide NEW "facilities," except as provided for in the Statement of Work.

C. However, the Government will provide EXISTING facilities as listed in Exhibit A. (Please note that Exhibit A also lists Special Test Equipment which is <u>not</u> included in the definition of "facilities".) Any of these existing facilities that reach the end of

their useful life during the contract period, or which are beyond economical repair, shall be replaced by the Contractor, if the facilities are still needed for contract performance. Contractor acquisitions of facility items for the Government is prohibited, unless specifically authorized by the contract or consent has been obtained in writing from the Contracting Officer pursuant to FAR 45.302-1(a).

D. Notwithstanding the "Allowable Cost and Payment" clause of this contract, cost of facilities are not an allowable cost except when charged to this contract in accordance with the Contractor's approved accounting system.

[END OF SECTION]

SECTION H - SPECIAL CONTRACT REQUIREMENTS

H.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: The following contract clauses pertinent to this section are hereby incorporated by reference:

I. FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

CLAUSE NUMBER	DATE	TITLE
52.204-9	JAN 2006	PERSONAL IDENTITY VERIFICATION OF CONTRACTOR PERSONNEL
52.223-5	AUG 2003	POLLUTION PREVENTION AND RIGHT-TO-KNOW INFORMATION (ALTERNATE II) (AUG 2003)

II. NASA FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

CLAUSE NUMBER	DATE	TITLE
1852.223-70	APR 2002	SAFETY AND HEALTH
1852.223-74	MAR 1996	DRUG- AND ALCOHOL-FREE WORKFORCE
1852.223-75	FEB 2002	MAJOR BREACH OF SAFETY OR SECURITY
1852.242-72	AUG 1992	OBSERVANCE OF LEGAL HOLIDAYS (ALTERNATE II) (OCT 2000)

H.2 SPECIAL 8(a) CONTRACT CONDITIONS (FAR 52.219-11) (FEB 1990) (DEVIATION)

(a) This contract is issued as a direct award between the contracting activity and the 8(a) contractor pursuant to a Memorandum of Understanding between the Small Business Administration (SBA) and the National Aeronautics and Space Administration. Accordingly, the SBA is not a party to this contract. SBA does retain responsibility for 8(a) certification, 8(a) eligibility determinations and related issues, and providing counseling and assistance to the 8(a) contractor under the 8(a) program. The cognizant SBA district office is:

U.S. Small Business Administration
Richmond District Office
Federal Building, Suite 1150
400 North 8th Street
Richmond, VA 23240-0126

(b) The contracting activity is responsible for administering the contract and taking any action on behalf of the Government under the terms and conditions of the contract; provided, however, that the contracting activity shall give advance notice to the SBA before it

issues a final notice terminating performance, either in whole or in part, under the contract. The contracting activity shall also coordinate with the SBA prior to processing any novation agreement. The contracting activity may assign contract administration functions to a contract administration office.

(c) The contractor agrees:

(1) to notify the Contracting Officer, simultaneous with its notification to SBA (as required by SBA's 8(a) regulations), when the owner or owners upon whom 8(a) eligibility is based plan to relinquish ownership or control of the concern. Consistent with Section 407 of Public Law 100-656, transfer of ownership or control shall result in termination of the contract for convenience, unless SBA waives the requirement for termination prior to the actual relinquishing of ownership and control.

(2) it will not subcontract the performance of any of the requirements of this contract without the prior written approval of the SBA and the Contracting Officer.

H.3 SECURITY CLASSIFICATION REQUIREMENTS (NFS 1852.204-75)(SEP 1989)

Performance under this contract will involve access to and/or generation of classified information, work in a security area, or both, up to the level of Secret. See Federal Acquisition Regulation clause 52.204-2 in this contract and DD Form 254, Contract Security Classification Specification, Exhibit D.

H.4 MINIMUM INSURANCE COVERAGE (NASA 1852.228-75) (OCT 1988)

The Contractor shall obtain and maintain insurance coverage as follows for the performance of this contract:

(a) Worker's compensation and employer's liability insurance as required by applicable Federal and state workers' compensation and occupational disease statutes. If occupational diseases are not compensable under those statutes, they shall be covered under the employer's liability section of the insurance policy, except when contract operations are so commingled with the Contractor's commercial operations that it would not be practical. The employer's liability coverage shall be at least $100,000, except in States with exclusive or monopolistic funds that do not permit workers' compensation to be written by private carriers.

(b) Comprehensive general (bodily injury) liability insurance of at least $500,000 per occurrence.

(c) Motor vehicle liability insurance written on the comprehensive form of policy which provides for bodily injury and property damage liability covering the operation of all motor vehicles used in connection with performing the contract. Policies covering motor vehicles operated in the United States shall provide coverage of at least $200,000 per person and $500,000 per occurrence for bodily injury liability and $20,000 per occurrence for property damage. The

amount of liability coverage on other policies shall be commensurate with any legal requirements of the locality and sufficient to meet normal and customary claims.

(d) Comprehensive general and motor vehicle liability policies shall contain a provision worded as follows:

> "The insurance company waives any right of subrogation against the United States of America which may arise by reason of any payment under the policy."

(e) When aircraft are used in connection with performing the contract, aircraft public and passenger liability insurance of at least $200,000 per person and $500,000 per occurrence for bodily injury, other than passenger liability, and $200,000 per occurrence for property damage. Coverage for passenger liability bodily injury shall be at least $200,000 multiplied by the number of seats or passengers, whichever is greater.

H.5 RESERVED

H.6 (LIMITED) RELEASE OF CONTRACTOR CONFIDENTIAL BUSINESS INFORMATION (CBI) (LaRC 52.204-104) (JAN 2002)

(a) NASA may find it necessary to release information submitted by the Contractor, either in response to this solicitation or pursuant to the provisions of this contract, to individuals not employed by NASA. Business information that would ordinarily be entitled to confidential treatment may be included in the information released to these individuals. Accordingly, by submission of this proposal, or signature on this contract or other contracts, the Contractor hereby consents to a limited release of its Confidential Business Information (CBI).

(b) Possible circumstances where the Agency may release the Contractor's CBI include, but are not limited to, the following:

(1) To other Agency contractors and subcontractors, and their employees tasked with assisting the Agency in handling and processing information and documents in the evaluation, the award or the administration of Agency contracts, such as providing both preaward and post award audit support and specialized technical support to NASA's technical evaluation panels;

(2) To NASA contractors and subcontractors, and their employees engaged in information systems analysis, development, operation, and maintenance, including performing data processing and management functions for the Agency.

(c) NASA recognizes its obligation to protect the contractor from competitive harm that could result from the release of such information to a competitor. Except where otherwise provided by law, NASA will permit the limited release of CBI under subparagraphs (1) or (2) only pursuant to non-disclosure agreements signed by the assisting

contractor or subcontractor, and their individual employees who may require access to the CBI to perform the assisting contract.

(d) NASA's responsibilities under the Freedom of Information Act are not affected by this clause.

(e) The Contractor agrees to include this clause, including this paragraph (e), in all subcontracts at all levels awarded pursuant to this contract that require the furnishing of CBI by the subcontractor.

H.7 SECURITY PROGRAM/NON-U.S. CITIZEN EMPLOYEE ACCESS REQUIREMENTS (LaRC 52.204-91) (FEB 2007)

Access to the LaRC by non-U.S. citizen employees, including those in permanent resident alien status, shall be approved in accordance with NPR 1371.2A, " Requirements for Processing Requests for Access to NASA Installations or Facilities by Foreign Nationals or U.S. Citizens Who are Reps of Foreign Entities". Processing requires advance notice of a minimum of 20 days depending on the nationality of the non-U.S. citizen or foreign representative. Access authorization shall be for a maximum of one year and must be re-evaluated annually. Non-U.S. citizen employees or foreign representatives must be under escort at all times while on Center (by a NASA Civil Servant or permanently badged contractor) unless otherwise approved by the International Visitors Coordinator (IVC).

H.8 OBSERVATION OF REGULATIONS AND IDENTIFICATION OF CONTRACTOR'S EMPLOYEES (LaRC 52.211-104) (FEB 2007)

(a) Observation of Regulations--In performance of that part of the contract work which may be performed at Langley Research Center (LaRC) or other Government installation, the Contractor shall require its employees to observe the rules and regulations as prescribed by the authorities at LaRC or other installation including all applicable Federal, NASA and Langley safety, health, environmental and security regulations.

(b) Identification Credentials--At all times while on LaRC property, the Contractor shall require its employees, subcontractors and agents to wear credentials issued by NASA LaRC. Contractors will be held accountable for these credentials, and may be required to validate its active employees on an annual basis with the NASA LaRC Security Office. Immediately upon employee termination or contract completion, badges shall be returned to the NASA LaRC Badge and Pass Office. It is agreed and understood that all NASA identification badges remain the property of NASA and the Government reserves the right to invalidate such badges at any time.

(c) Employee Out Processing--The Contractor shall ensure that all employees who are terminated or no longer connected with work being performed under this contract are out processed through the LaRC Badge and Pass Office. Badges and keys must be accounted for and returned.

H.9 INCORPORATION OF SECTION K OF THE PROPOSAL BY REFERENCE (LaRC 52.215-107) (NOV 2002)

Pursuant to FAR 15.204-1(b), the completed Section K of the proposal is hereby incorporated by reference.

H.10 ENABLING CLAUSE BETWEEN ROME CONTRACTOR AND OTHER LANGLEY CONTRACTORS (LaRC 52.215-116) (FEB 2003)

(a) NASA has entered into contracts with the firms listed below for other support services at Langley Research Center:

Contractor	Services
Jacobs Sverdrup	Research Operations, Maintenance, and Engineering (ROME)
ACS, Inc.	Outsourcing Desktop Initiative for NASA (ODIN)
Raytheon Technical Services Co.	Consolidated Information Technology (ConITS)
MLB Enterprises	Groundskeeping and Pest Control Services

(b) In the performance of this contract, the IQA Contractor agrees to cooperate with the above listed Contractors by: responding to invitations from authorized personnel to attend meetings; providing access to technical information and research, development and planning data, test data and results, schedule and milestone data; limited financial data including estimates, all in original form or reproduced, discussing/coordinating matters related to projects; providing access to Contractor facilities utilized in the performance of this contract; and allowing observation of technical activities by appropriate support Contractor technical personnel.

(c) The Contractor further agrees to include in each subcontract over percent of prime contract value, whichever is less, a clause requiring compliance by a subcontractor and succeeding levels of subcontractors with the response and access provisions of paragraph (b) above, subject to coordination with the Contractor. This agreement does not relieve the Contractor of responsibility to manage subcontracts effectively and efficiently, nor is it intended to establish privity of contracts between the Government or the service Contractor(s) and such subcontractors.

(d) Contractor personnel are not authorized to direct another Contractor in any manner.

(e) To the extent that the work under this contract requires access to proprietary information, and as long as these data remain proprietary, the Contractor shall protect the data from unauthorized use and disclosure.

(f) Neither the Contractor nor their subcontractors shall be required in the satisfaction of the requirements of this clause to perform any effort or supply any documentation not otherwise required by their contract or subcontract.

H.11 HANDLING OF DATA LaRC 52.227-28 (MAY 2003)

(a) "DATA," as used in this clause, means recorded information, regardless of the form, the media on which it may be recorded, or the method of recording. The term includes, but is not limited to, models, photographs, lab notebooks, diagrams, drawings, information subject to the Privacy Act, information of a scientific or technical nature, computer software and documentation thereof, and information of a commercial or financial nature.

(b) In the performance of this contract the Contractor will have access to, be furnished, generate, or use one or more of the following categories of DATA:

(1) DATA of third parties that the Government has agreed to handle under protective arrangements;

(2) Government DATA, the use and dissemination of which the Government intends to control or is required to control by law; or

(3) DATA that the Contractor will create or assist in creating under this contract that the Government has agreed to handle under protective arrangements or indicates that it intends to control.

(c) In order to protect the interests of the Government and the owners, licensors and licensees of such DATA, the Contractor agrees, with respect to any of the types of DATA identified in paragraph (b), above, that is either marked with a restrictive legend, specifically identified to the Contractor as DATA being generated and to be marked with a restrictive legend, or otherwise identified in writing by the Contracting Officer or his or her representative as being subject to this clause, to:

(1) Use, disclose, and reproduce such DATA only to the extent necessary to perform the work required under this contract;

(2) Allow access to such DATA only to those of its employees that require access for their performance under this contract;

(3) Preclude access and disclosure of such DATA by the Contractor's personnel outside of that portion of the Contractor's organization needed for the performance of the Contractor's duties under this contract; and

(4) Return or dispose of such DATA, as the Contracting Officer or his or her representative may direct when the DATA is no longer needed for contract performance.

(d) In the event that DATA includes a legend that the Contractor deems to be ambiguous or unauthorized, the Contractor shall inform the Contracting Officer of such condition. Notwithstanding the ambiguous or unauthorized nature of such a legend, as long as the legend provides an indication that a restriction on the use or disclosure was intended, the Contractor shall treat such DATA pursuant to the

requirements of this clause unless otherwise directed, in writing, by the Contracting Officer.

(e) Subject to the notice requirements in (f), below, the Contractor shall not be restricted in the use, disclosure, and reproduction of DATA that:

(1) Is, or becomes, generally available or public knowledge without breach of this clause by the Contractor or its employees;

(2) Is known to the Contractor at the time of disclosure; has been disclosed to the Contractor without restriction from the Government; or has been independently developed by the Contractor outside of the Contractor's activities under this contract;

(3) Has become known to the Contractor without similar restrictions from a source other than the Government or any party having work performed under this contract, that source having the right to disclose such DATA; or

(4) The Contractor is required to produce such DATA pursuant to a court order or similar Government action.

(f) If the Contractor believes that any event or condition removes the restrictions on their use, disclosure, or reproduction of DATA, the Contractor shall promptly notify the Contracting Officer in writing of such belief before acting on such belief, and, in any event, shall give written notice to the Contracting Officer before unrestricted use, disclosure, or reproduction of such DATA.

(g) Before the Contractor has access to DATA identified in paragraph (b), above, the Contractor shall provide the Contracting Officer an acceptable written plan by which it intends to assure that its personnel who hav e or might reasonably have access to any such DATA, will honor the Contractor's obligation to safeguard such DATA. Should the Contracting Officer consider the proposed plan inadequate, the Contractor will be advised of the inadequacy and the Contractor will provide a revised plan. The Contracting Officer may suspend work under this contract, at no cost to the Government, until such time as the written plan of the Contractor is considered acceptable to the Contracting Officer.

(h) The Contractor agrees to inform and instruct its employees of its and their obligations under this clause and to appropriately bind its employees contractually to comply with the access, use, disclosure, and reproduction provisions of this clause.

NOTE: After contract award, the nonapplicable Quality Management System clause below will be deleted from this contract through issuance of a contract modification.

H.12 QUALITY MANAGEMENT SYSTEM COMPLIANCE REQUIREMENTS (ISO 9001:2000) (LaRC 52.246-96) (SEP 2002)

The Contractor's quality system shall be compliant with the requirements of the current ANSI/ISO/ASQC Q ISO 9001 standard, Quality Management Systems Requirements.

Since the Contractor's quality system is not already compliant with the requirements of the current ANSI/ISO/ASQC Q ISO 9001 standard, the Contractor shall develop quality system procedures and associated documentation to become compliant within nine months after the contract effective date.

Once compliance with the current ANSI/ISO/ASQC Q ISO 9001has been achieved, an updated Quality System Manual and final documentation (addressing the topics noted in the Contractor's compliance plan) should be submitted for review and acceptance.

The Contractor's quality system shall remain in compliance with the ISO 9001 standard during the term of the contract. The Government reserves the right to audit the Contractor's quality system at any time.

"Compliant" as used in this clause means that the contractor has defined, documented, and will continually implement during the term of the contract management-approved methods of operation that conform to the requirements given in the above-cited International Standard.

OR

H.12 QUALITY MANAGEMENT SYSTEM REQUIREMENTS (ISO 9001:2000) (LaRC 52.246-97) (SEP 2002)

The Contractor's quality system shall be compliant with the requirements of the current ANSI/ISO/ASQC Q ISO 9001 standard, Quality Management Systems Requirements.

The Contractor's quality system shall remain in compliance with the ISO 9001 standard during the term of the contract. The Government reserves the rights to audit the Contractor's quality system at any time

"Compliant" as used in this clause means that the contractor has defined, documented, and will continually implement during the term of the contract management-approved methods of operation that conform to the requirements given in the above-cited International Standard.

H.13 LIMITATION OF FUTURE CONTRACTING (NASA 1852.209-71) (DEC 1988)

(a) The Contracting Officer has determined that this acquisition may give rise to a potential organizational conflict of interest. Accordingly, the attention of prospective offerors is invited to FAR Subpart 9.5--Organizational Conflicts of Interest.

(b) The nature of the conflicts are:

(1) The contractor shall provide construction inspection and construction management support. As such, the contractor would be in a position to self-evaluate its own work.

(2) The contractor may also have access to proprietary information and to various other types of data. As such, the contractor would be in a position to obtain non-public information, thus, creating a potential conflict of interest.

(3) The contractor shall provide inspection services for the Research, Operations, Maintenance and Engineering (ROME) contractor and its subcontractors. As such, the contractor would be in a position to self-evaluate its own work should it provide work on the ROME contract or serve as a subcontractor on the ROME contract creating a potential conflict of interest.

(c) The restrictions upon future contracting are as follows:

(1) The Contractor shall not be awarded any contracts to provide construction services.

(2) To the extent that the work under this contract requires access to proprietary, business confidential, or financial data of other companies, and as long as these data remain proprietary or confidential, the Contractor shall protect these data from unauthorized use and disclosure and agrees not to use them to compete with other companies. Further, restrictions and procedures governing the contractor's use of proprietary or confidential business information are found in H.11, Handling of Data.

(3) The contractor, as well as its subcontractors at all tiers, is prohibited from participating under the NASA Langley ROME contract, or any successor contract, as the prime contractor or as a subcontractor at any tier. An identical clause is in the ROME contract and in any successor contract.

H.14 OBSERVATION OF SAFETY STAND DOWN EVENT BY CONTRACTOR EMPLOYEES (LaRC 52.223-92) (May 2006)

The Langley Research Center (LaRC) Safety Stand Down Event is an annual event dedicated to learning best practices for a safe work environment. When the LaRC Director designates the Safety Stand Down event, the Contractor shall require all onsite and nearsite employees to participate in Safety Stand Down activities at LaRC.

H.15 RELEASE OF SENSTIVE INFORMATION (NFS 1852.237-73) (JUN 2005)

(a) As used in this clause, "sensitive information" refers to information, not currently in the public domain, that the Contractor has developed at private expense, that may embody trade secrets or commercial or financial information, and that may be sensitive or privileged.

(b) In accomplishing management activities and administrative functions, NASA relies heavily on the support of various service providers. To support NASA activities and functions, these service providers, as well as their subcontractors and their individual employees, may need access to sensitive information submitted by the Contractor under this contract. By submitting this proposal or performing this contract, the Contractor agrees that NASA may release to its service providers, their subcontractors, and their individual employees, sensitive information submitted during the course of this procurement, subject to the enumerated protections mandated by the clause at 1852.237-72, Access to Sensitive Information.

(c)(1) The Contractor shall identify any sensitive information submitted in support of this proposal or in performing this contract. For purposes of identifying sensitive information, the Contractor may, in addition to any other notice or legend otherwise required, use a notice similar to the following:

Mark the title page with the following legend:

This proposal or document includes sensitive information that NASA shall not disclose outside the Agency and its service providers that support management activities and administrative functions. To gain access to this sensitive information, a service provider's contract must contain the clause at NFS 1852.237-72, Access to Sensitive Information. Consistent with this clause, the service provider shall not duplicate, use, or disclose the information in whole or in part for any purpose other than to perform the services specified in its contract. This restriction does not limit the Government's right to use this information if it is obtained from another source without restriction. The information subject to this restriction is contained in pages [insert page numbers or other identification of pages].

Mark each page of sensitive information the Contractor wishes to restrict with the following legend:

Use or disclosure of sensitive information contained on this page is subject to the restriction on the title page of this proposal or document.

(2) The Contracting Officer shall evaluate the facts supporting any claim that particular information is "sensitive." This evaluation shall consider the time and resources necessary to protect the information in accordance with the detailed safeguards mandated by the clause at 1852.237-72, Access to Sensitive Information. However, unless the Contracting Officer decides, with the advice of Center counsel, that reasonable grounds exist to challenge the Contractor's claim that particular information is sensitive, NASA and its service providers and their employees shall comply with all of the safeguards contained in paragraph (d) of this clause.

(d) To receive access to sensitive information needed to assist NASA in accomplishing management activities and administrative functions, the service provider must be operating under a contract that contains the clause at 1852.237-72, Access to Sensitive Information. This clause obligates the service provider to do the following:

(1) Comply with all specified procedures and obligations, including the

Organizational Conflicts of Interest Avoidance Plan, which the contract has incorporated as a compliance document.

(2) Utilize any sensitive information coming into its possession only for the purpose of performing the services specified in its contract.

(3) Safeguard sensitive information coming into its possession from unauthorized use and disclosure.

(4) Allow access to sensitive information only to those employees that need it to perform services under its contract.

(5) Preclude access and disclosure of sensitive information to persons and entities outside of the service provider's organization.

(6) Train employees who may require access to sensitive information about their obligations to utilize it only to perform the services specified in its contract and to safeguard it from unauthorized use and disclosure.

(7) Obtain a written affirmation from each employee that he/she has received and will comply with training on the authorized uses and mandatory protections of sensitive information needed in performing this contract.

(8) Administer a monitoring process to ensure that employees comply with all reasonable security procedures, report any breaches to the Contracting Officer, and implement any necessary corrective actions.

(e) When the service provider will have primary responsibility for operating an information technology system for NASA that contains sensitive information, the service provider's contract shall include the clause at 1852.204-76, Security Requirements for Unclassified Information Technology Resources. The Security Requirements clause requires the service provider to implement an Information Technology Security Plan to protect information processed, stored, or transmitted from unauthorized access, alteration, disclosure, or use. Service provider personnel requiring privileged access or limited privileged access to these information technology systems are subject to screening using the standard National Agency Check (NAC) forms appropriate to the level of risk for adverse impact to NASA missions. The Contracting Officer may allow the service provider to conduct its own screening, provided the service provider employs substantially equivalent screening procedures.

(f) This clause does not affect NASA's responsibilities under the Freedom of Information Act.

(g) The Contractor shall insert this clause, including this paragraph (g), suitably modified to reflect the relationship of the parties, in all subcontracts that may require the furnishing of sensitive information.

[END OF SECTION]

PART II - CONTRACT CLAUSES

SECTION I - CONTRACT CLAUSES

I.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE

NOTICE: The following contract clauses pertinent to this section are hereby incorporated by reference:

a. The following clauses are applicable to the entire contract (CLINs 01-02).

FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1) CLAUSES

CLAUSE NUMBER	DATE	TITLE
52.202-1	DEC 2001	DEFINITIONS
52.203-3	APR 1984	GRATUITIES
52.203-5	APR 1984	COVENANT AGAINST CONTINGENT FEES
52.203-6	JUL 1995	RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT
52.203-7	JUL 1995	ANTI-KICKBACK PROCEDURES
52.203-8	JAN 1997	CANCELLATION, RESCISSION AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY
52.203-10	JAN 1997	PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY
52.203-12	JUN 2003	LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS
52.204-2	AUG 1996	SECURITY REQUIREMENTS
52.204-4	AUG 2000	PRINTED OR COPIED DOUBLE-SIDED ON RECYCLED PAPER
52.204-7	OCT 2003	CENTRAL CONTRACTOR REGISTRATION
52.209-6	JUL 1995	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT
52.211-15	SEP 1990	DEFENSE PRIORITY AND ALLOCATION REQUIREMENTS
52.215-2	JUN 1999	AUDIT AND RECORDS--NEGOTIATION
52.215-15	JAN 2004	PENSION ADJUSTMENTS AND ASSET REVERSIONS
52.215-17	OCT 1997	WAIVER OF FACILITIES CAPITAL COST OF MONEY
52.215-18	OCT 1997	REVERSION OR ADJUSTMENT OF PLANS FOR POSTRETIREMENT BENEFITS (PRB) OTHER THAN PENSIONS
52.215-19	OCT 1997	NOTIFICATION OF OWNERSHIP CHANGES

52.215-21	OCT 1997	REQUIREMENTS FOR COST OR PRICING DATA OR INFORMATION OTHER THAN COST OR PRICING DATA -- MODIFICATIONS
52.219-8	OCT 2000	UTILIZATION OF SMALL BUSINESS CONCERNS
52.219-14	DEC 96	LIMITATIONS ON SUBCONTRACTING
52.219-18	JUN 2003	NOTIFICATION OF COMPETITION LIMITED TO ELIGIBLE 8(a) CONCERNS (DEVIATION)
52.222-1	FEB 1997	NOTICE TO THE GOVERNMENT OF LABOR DISPUTES
52.222-3	JUN 2003	CONVICT LABOR
52.222-21	FEB 1999	PROHIBITION OF SEGREGATED FACILITIES
52.222-26	APR 2002	EQUAL OPPORTUNITY
52.222-35	DEC 2001	EQUAL OPPORTUNITY FOR SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA, AND OTHER ELIGIBLE VETERANS
52.222-36	JUN 1998	AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES
52.222-37	DEC 2001	EMPLOYMENT REPORTS ON SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA, AND OTHER ELIGIBLE VETERANS
52.222-41	MAY 1989	SERVICE CONTRACT ACT OF 1965, AS AMENDED
52.223-6	MAY 2001	DRUG-FREE WORKPLACE
52.223-10	AUG 2000	WASTE REDUCTION PROGRAM
52.223-14	AUG 2003	TOXIC CHEMICAL RELEASE REPORTING
52.224-1	APR 1984	PRIVACY ACT NOTIFICATION
52.224-2	APR 1984	PRIVACY ACT
52.225-13	OCT 2003	RESTRICTIONS ON CERTAIN FOREIGN PURCHASES
52.227-1	JUL 1995	AUTHORIZATION AND CONSENT
52.227-2	AUG 1996	NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT
52.227-14	JUN 1987	RIGHTS IN DATA--GENERAL As modified by 1852.227-14 NASA FAR Supplement (OCT 1995)
52.232-9	APR 1984	LIMITATION ON WITHHOLDING OF PAYMENTS
52.232-17	JUN 1996	INTEREST
52.232-18	APR 1984	AVAILABILITY OF FUNDS
52.232-23	JAN 1986	ASSIGNMENT OF CLAIMS
52.232-34	MAY 1999	PAYMENT BY ELECTRONIC FUNDS TRANSFER--OTHER THAN CENTRAL CONTRACTOR REGISTRATION
52.233-1	JUL 2002	DISPUTES
52.237-2	APR 1984	PROTECTION OF GOVERNMENT BUILDINGS, EQUIPMENT, AND VEGETATION
52.237-3	JAN 1991	CONTINUITY OF SERVICES
52.239-1	AUG 1996	PRIVACY OR SECURITY SAFEGUARDS
52.242-3	MAY 2001	PENALTIES FOR UNALLOWABLE COSTS
52.242-13	JUL 1995	BANKRUPTCY
52.246-25	FEB 1997	LIMITATION OF LIABILITY-- SERVICES
52.247-1	APR 1984	COMMERCIAL BILL OF LADING NOTATIONS
52.253-1	JAN 1991	COMPUTER GENERATED FORMS

NASA FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

CLAUSE NUMBER	DATE	TITLE
1852.208-81	OCT 2001	RESTRICTIONS ON PRINTING AND DUPLICATING
1852.219-76	JUL 1997	NASA 8 PERCENT GOAL
1852.225-70	FEB 2000	EXPORT LICENSES
1852.237-70	DEC 1988	EMERGENCY EVACUATION PROCEDURES
1852.243-71	MAR 1977	SHARED SAVINGS

b. The following clauses are applicable only to the cost reimbursable (CLIN 01) task orders issued under this contract.

FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1) CLAUSES

CLAUSE NUMBER	DATE	TITLE
52.216-7	DEC 2002	ALLOWABLE COST AND PAYMENT ***Insert "30TH" in Paragraph (a)(3).***
52.216-8	MAR 1997	FIXED FEE
52.222-2	JUL 1990	PAYMENT FOR OVERTIME PREMIUMS ***Insert "0" in paragraph (a).***
52.228-7	MAR 1996	INSURANCE - LIABILITY TO THIRD PERSONS
52.232-22	APR 1984	LIMITATION OF FUNDS
52.232-25	OCT 2003	PROMPT PAYMENT (ALTERNATE I) (FEB 2002)
52.233-3	AUG 1996	PROTEST AFTER AWARD (ALTERNATE I) (JUN 1985)
52.242-1	APR 1984	NOTICE OF INTENT TO DISALLOW COSTS
52.242-4	JAN 1997	CERTIFICATION OF FINAL INDIRECT COSTS
52.243-2	AUG 1987	CHANGES—COST-REIMBURSEMENT (ALTERNATE I) (APR 1984)
52.244-2	AUG 1998	SUBCONTRACTS (ALTERNATE I) (AUG 1998)
52.244-6	APR 2003	SUBCONTRACTS FOR COMMERCIAL ITEMS
52.244-5	DEC 1996	COMPETITION IN SUBCONTRACTING
52.245-5	JUN 2003	GOVERNMENT PROPERTY (COST-REIMBURSEMENT, TIME-AND-MATERIAL, OR LABOR-HOUR CONTRACTS
52.249-6	SEP 1996	TERMINATION (COST-REIMBURSEMENT)
52.249-14	APR 1984	EXCUSABLE DELAYS

NASA/FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

1852.216-75	DEC 1988	PAYMENT OF FIXED FEE
1852.216-89	JUL 1997	ASSIGNMENT AND RELEASE FORMS
1852.219-74	SEP 1990	USE OF RURAL AREA SMALL BUSINESSES

c. The following clauses are applicable only to the fixed price (CLIN 02) task orders issued under this contract.

FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1) CLAUSES

CLAUSE NUMBER	DATE	TITLE
52.222-43	MAY 1989	FAIR LABOR STANDARDS ACT AND SERVICE CONTRACT ACT--PRICE ADJUSTMENT (MULTIYEAR AND OPTION CONTRACTS)
52.228-5	JAN 1997	INSURANCE--WORK ON A GOVERNMENT INSTALLATION
52.229-3	APR 2003	FEDERAL, STATE, AND LOCAL TAXES
52.232-1	APR 1984	PAYMENTS
52.232-8	FEB 2002	DISCOUNTS FOR PROMPT PAYMENT
52.232-11	APR 1984	EXTRAS
52.232-25	OCT 2003	PROMPT PAYMENT
52.233-3	AUG 1996	PROTEST AFTER AWARD (ALTERNATE I)
52.242-15	AUG 1989	STOP-WORK ORDER (AUG 1980)
52.243-1	AUG 1987	CHANGES—FIXED PRICE (ALTERNATE I) (APR 1984)
52.245-2	JUN 2003	GOVERNMENT PROPERTY (FIXED-PRICE CONTRACTS
52.249-4	APR 1984	TERMINATION FOR THE CONVENIENCE OF THE GOVERNMENT (SERVICES) (SHORT FORM)
52.29-8	APR 1984	DEFAULT (FIXED-PRICE SUPPLY AND SERVICE)

NASA/FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

None included by reference.

I.2 CLAUSES INCORPORATED BY REFERENCE (FAR 52.252-2) (FEB 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

http://www.arnet.gov/far/

http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm

I.3 OMBUDSMAN (NFS 1852.215-84) (OCT 2003) (ALTERNATE I) (JUN 2000)

(a) An ombudsman has been appointed to hear and facilitate the resolution of concerns from offerors, potential offerors, and contractors during the preaward and postaward phases of this acquisition. When requested, the ombudsman will maintain strict confidentiality as to the source of the concern. The existence of the ombudsman is not to diminish the authority of the contracting officer, the Source Evaluation Board, or the selection official. Further, the ombudsman does not participate in the evaluation of proposals, the

source selection process, or the adjudication of formal contract disputes. Therefore, before consulting with an ombudsman, interested parties must first address their concerns, issues, disagreements, and/or recommendations to the contracting officer for resolution.

(b) If resolution cannot be made by the contracting officer, interested parties may contact the installation ombudsman, Cynthia C. Lee, direct inquires to Mary Jane Yeager, NASA Langley Research Center, Mail Stop 134, Hampton, VA 23681-2199; phone (757) 864-2473; facsimile (757) 864-8541; email .

Concerns, issues, disagreements, and recommendations which cannot be resolved at the installation may be referred to the NASA ombudsman, the Director of the Contract Management Division, at 202-358-0445, facsimile 202-358-3083, e-mail james.a.balinskas@nasa.gov. Please do not contact the ombudsman to request copies of the solicitation, verify offer due date, or clarify technical requirements. Such inquiries shall be directed to the contracting officer or as specified elsewhere in this document.

(c) If this is a task or delivery order contract, the ombudsman shall review complaints from contractors and ensure they are afforded a fair opportunity to be considered, consistent with the procedures of the contract.

I.4 ORDERING (FAR 52.216-18) (OCT 1995)

(a) Any supplies and services to be furnished under this contract shall be ordered by issuance of delivery orders or task orders by the individuals or activities designated in the Schedule. Such orders may be issued from the effective date of the contract through seven days prior to the end of the contract period of performance.
(b) All delivery orders or task orders are subject to the terms and conditions of this contract. In the event of conflict between delivery order or task order and this contract, the contract shall control.

(c) If mailed, a delivery order or task order is considered "issued" when the Government deposits the order in the mail. Orders may be issued orally, by facsimile, or by electronic commerce methods only if authorized in the Schedule.

I.5 ORDER LIMITATIONS (FAR 52.216-19) (OCT 1995)

(a) Minimum order. When the Government requires supplies or services covered by this contract in an amount of less than $25 the Government is not obligated to purchase, nor is the Contractor obligated to furnish, those supplies or services under the contract.

(b) Maximum order. The Contractor is not obligated to honor—

(1) Any order for a single item in excess of $1,000,000.

(2) Any order for a combination of items in excess of $1,000,000; or

(3) A series of orders from the same ordering office within 30 days that together call for quantities exceeding the limitation in subparagraph (1) or (2) of this section.

(c) If this is a requirements contract (i.e., includes the Requirements clause at subsection 52.216-21 of the Federal Acquisition Regulation (FAR)), the Government is not required to order a part of any one requirement from the Contractor if that requirement exceeds the maximum-order limitations in paragraph (b) of this section.

(d) Notwithstanding paragraphs (b) and (c) of this section, the Contractor shall honor any order exceeding the maximum order limitations in paragraph (b), unless that order (or orders) is returned to the ordering office within 3 days after issuance, with written notice stating the Contractor's intent not to ship the item (or items) called for and the reasons. Upon receiving this notice, the Government may acquire the supplies or services from another source.

I.6 INDEFINITE QUANTITY (FAR 52.216-22) (OCT 1995)

(a) This is an indefinite-quantity contract for the supplies or services specified, and effective for the period stated, in the Schedule. The quantities of supplies and services specified in the Schedule are estimates only and are not purchased by this contract.

(b) Delivery or performance shall be made only as authorized by orders issued in accordance with the Ordering clause. The Contractor shall furnish to the Government, when and if ordered, the supplies or services specified in the Schedule up to and including the quantity designated in the Schedule as the "maximum." The Government shall order at least the quantity of supplies or services designated in the Schedule as the "minimum."

(c) Except for any limitations on quantities in the Order Limitations clause or in the Schedule, there is no limit on the number of orders that may be issued. The Government may issue orders requiring delivery to multiple destinations or performance at multiple locations.

(d) Any order issued during the effective period of this contract and not completed within that period shall be completed by the Contractor within the time specified in the order. The contract shall govern the Contractor's and Government's rights and obligations with respect to that order to the same extent as if the order were completed during the contract's effective period; provided, that the Contractor shall not be required to make any deliveries under this contract after three months past the contract completion date.

I.7 STATEMENT OF EQUIVALENT RATES FOR FEDERAL HIRES (FAR 52.222-42) (MAY 1989)

In compliance with the Service Contract Act of 1965, as amended, and the regulations of the Secretary of Labor (29 CFR Part 4), this clause identifies the classes of service employees expected to be employed under the contract and states the wages and fringe benefits payable to each if they were employed by the contracting agency subject to the provisions of 5 U.S.C. 5341 or 5332.

THIS STATEMENT IS FOR INFORMATION ONLY: IT IS NOT A WAGE DETERMINATION

Employee Class	Government Equivalent ($ per Hour)
Construction Manager/Engineer	32.79
Task Order Administrative Secretary	17.25
Accounting Clerk	12.55
Inspection Supervisor/Estimator	32.79
Software Quality Assurance Specialist	32.79
Construction Inspectors	22.55
Quality Assurance Evaluator	23.01
Surveyor	23.01
Radiograph Monitor	13.99
Elevator Inspector	22.55

FRINGE BENEFITS

Annual Leave - Receives 13 days paid leave for service up to 3 years; 20 days for 3 to 15 years service; and 26 days for 15 years service or over.

Sick Leave - Receives 13 days paid leave per year.

Holidays - Receives 10 paid holidays per year.

Health Insurance - Government pays up to 60% of health insurance.

Group Life Insurance - Government pays two-thirds of life insurance rate premiums.

Retirement - The Government provides three retirement plans identified as the Civil Service Retirement System (CSRS), the Federal Employees Retirement System (FERS), and the CSRS Offset. Under the CSRS, the Government contributes 7% of the employees' base pay towards the retirement benefit and 1.45% towards Medicare. Under the FERS, the Government contributes 11.4% of the employees' base pay towards a basic benefit plan, 6.2% to Social Security, 1.45% towards Medicare, and 1% (plus matching contributions of up to 4% of basic pay, depending on employees' contributions) to a thrift savings plan. Under the CSRS Offset, the Government contributes 0.8% of the employees' base pay towards the retirement benefit, 6.2% to Social Security, and 1.45% towards Medicare.
Part-time Federal employees receive pro rata annual leave, sick leave, holiday leave, health insurance, and group life insurance benefits based on the number of hours worked.

I.8 ESTIMATE OF PERCENTAGE OF RECOVERED MATERIAL CONTENT FOR EPA-DESIGNATED PRODUCTS (FAR 52.223-9) (AUG 2000)

(a) Definitions. As used in this clause--

"Postconsumer material" means a material or finished product that has served its intended use and has been discarded for disposal or recovery, having completed its life as a consumer item. Postconsumer material is a part of the broader category of "recovered material."

"Recovered material" means waste materials and by-products recovered or diverted from solid waste, but the term does not include those materials and by-products generated from, and commonly reused within, an original manufacturing process.

(b) The Contractor, on completion of this contract, shall--

(1) Estimate the percentage of the total recovered material used in contract performance, including, if applicable, the percentage of postconsumer material content; and

(2) Submit this estimate to the Contracting Officer.

I.9 SECURITY REQUIREMENTS FOR UNCLASSIFIED INFORMATION TECHNOLOGY RESOURCES (NFS 1852.204-76) (NOVEMBER 2004 [(DEVIATION])

(a) The Contractor shall be responsible for information and information technology (IT) security when the Contractor or its subcontractors must obtain physical or electronic (i.e., authentication level 2 and above as defined in National Institute of Standards and Technology (NIST) Special Publication (SP) 800-63, Electronic Authentication Guideline) access to NASA's computer systems, networks, or IT infrastructure, or where information categorized as low, moderate, or high by the Federal Information Processing Standards (FIPS) 199, Standards for Security Categorization of Federal Information and Information Systems, is stored, generated, or exchanged by NASA or on behalf of NASA by a contractor or subcontractor, regardless of whether the information resides on a NASA or a contractor/subcontractor's information system.

(b) IT Security Requirements.

(1) Within 30 days after contract award, a Contractor shall submit to the Contracting Officer for NASA approval an IT Security Plan, Risk Assessment, and FIPS 199, Standards for Security Categorization of Federal Information and Information Systems, Assessment. These plans and assessments, including annual updates shall be incorporated into the contract as compliance documents.

(i) The IT system security plan shall be prepared consistent, in form and content, with NIST SP 800-18, Guide for Developing Security Plans for Federal Information Systems, and any additions/augmentations described in NASA Procedural Requirements (, Security of Information Technology. The security plan shall identify and document appropriate IT security controls consistent with the sensitivity of the information and the requirements of Federal Information Processing Standards (FIPS) 200, Recommended Security Controls for Federal Information Systems. The plan shall be reviewed and updated in accordance with NIST SP 800-26, Security Self-Assessment Guide for Information Technology Systems, and FIPS 200, on a yearly basis.

(ii) The risk assessment shall be prepared consistent, in form and content, with NIST SP 800-30, Risk Management Guide for Information Technology Systems, and any additions/augmentations described in NPR 2810. The risk assessment shall be updated on a yearly basis.

(iii) The FIPS 199 assessment shall identify all information types as well as the "high water mark," as defined in FIPS 199, of the processed, stored, or transmitted information necessary to fulfill the contractual requirements.

(2) The Contractor shall produce contingency plans consistent, in form and content, with NIST SP 800-34, Contingency Planning Guide for Information Technology Systems, and any additions/augmentations described in NPR 2810. The Contractor shall perform yearly "Classroom Exercises." "Functional Exercises," shall be coordinated with the Center CIOs and be conducted once every three years, with the first conducted within the first two years of contract award. These exercises are defined and described in NIST SP 800-34.

(3) The Contractor shall ensure coordination of its incident response team with the NASA Incident Response Center and the NASA Security Operations Center.

(4) The Contractor shall ensure that its employees, in performance of the contract, receive annual IT security training in NASA IT Security policies, procedures, computer ethics, and best practices in accordance with NPR 2810 requirements. The Contractor may use web-based training available from NASA to meet this requirement.

(5) The Contractor shall provide NASA, including the NASA Office of Inspector General, access to the Contractor's and subcontractors' facilities, installations, operations, documentation, databases, and personnel used in performance of the contract. Access shall be provided to the extent required to carry out IT security inspection, investigation, and/or audits to safeguard against threats and hazards to the integrity, availability, and confidentiality of NASA information or to the function of computer systems operated on behalf of NASA, and to preserve evidence of computer crime. To facilitate mandatory reviews, the Contractor shall ensure appropriate compartmentalization of NASA information, stored and/or processed, either by information systems in direct support of the contract or that are incidental to the contract.

(6) The Contractor shall ensure that all individuals who perform tasks as a system administrator, or have authority to perform tasks normally performed by a system administrator, demonstrate knowledge appropriate to those tasks. Knowledge is demonstrated through the NASA System Administrator Security Certification Program. A system administrator is one who provides IT services, network services, files storage, and/or web services, to someone else other than themselves and takes or assumes the responsibility for the security and administrative controls of that service. Within 30 days after contract award, the Contractor shall provide to the Contracting Officer a list of all system administrator positions and personnel filling those positions, along with a schedule that ensures certification of all personnel within 90 days after contract award. Additionally, the Contractor should report all personnel changes which

impact system administrator positions within 5 days of the personnel change and ensure these individuals obtain System Administrator certification within 90 days after the change.

(7) When the Contractor is located at a NASA Center or installation or is using NASA IP address space, the Contractor shall --

(i) Submit requests for non-NASA provided external Internet connections to the Contracting Officer for approval by the Network Security Configuration Control Board (NSCCB);

(ii) Comply with the NASA CIO metrics including patch management, operating systems and application configuration guidelines, vulnerability scanning, incident reporting, system administrator certification, and security training; and

(iii) Utilize the NASA Public Key Infrastructure (PKI) for all encrypted communication or non-repudiation requirements within NASA when secure email capability is required.

(c) Physical and Logical Access Requirements.

(1) Contractor personnel requiring access to IT systems operated by the Contractor for NASA or interconnected to a NASA network shall be screened at an appropriate level in accordance with NPR 2810 and Chapter 4, NPR 1600.1, NASA Security Program Procedural Requirements. NASA shall provide screening, appropriate to the highest risk level, of the IT systems and information accessed, using, as a minimum, National Agency Check with Inquiries (NACI). The Contractor shall submit the required forms to the NASA Center Chief of Security (CCS) within fourteen (14) days after contract award or assignment of an individual to a position requiring screening. The forms may be obtained from the CCS. At the option of NASA, interim access may be granted pending completion of the required investigation and final access determination. For Contractors who will reside on a NASA Center or installation, the security screening required for all required access (e.g., installation, facility, IT, information, etc.) is consolidated to ensure only one investigation is conducted based on the highest risk level. Contractors not residing on a NASA installation will be screened based on their IT access risk level determination only. See NPR 1600.1, Chapter 4.

(2) Guidance for selecting the appropriate level of screening is based on the risk of adverse impact to NASA missions. NASA defines three levels of risk for which screening is required (IT-1 has the highest level of risk).

(i) IT-1 -- Individuals having privileged access or limited privileged access to systems whose misuse can cause very serious adverse impact to NASA missions. These systems include, for example, those that can transmit commands directly modifying the behavior of spacecraft, satellites or aircraft.

(ii) IT-2 -- Individuals having privileged access or limited privileged access to systems whose misuse can cause serious adverse impact to NASA missions. These systems include, for example, those that can transmit commands directly modifying the behavior of payloads on spacecraft, satellites or aircraft; and those that contain the primary copy of "level 1" information whose cost to replace exceeds one million dollars.

(iii) IT-3 -- Individuals having privileged access or limited privileged access to systems whose misuse can cause

significant adverse impact to NASA missions. These systems include, for example, those that interconnect with a NASA network in a way that exceeds access by the general public, such as bypassing firewalls; and systems operated by the Contractor for NASA whose function or information has substantial cost to replace, even if these systems are not interconnected with a NASA network.

(3) Screening for individuals shall employ forms appropriate for the level of risk as established in Chapter 4, NPR 1600.1.

(4) The Contractor may conduct its own screening of individuals requiring privileged access or limited privileged access provided the Contractor can demonstrate to the Contracting Officer that the procedures used by the Contractor are equivalent to NASA's personnel screening procedures for the risk level assigned for the IT position.

(5) Subject to approval of the Contracting Officer, the Contractor may forgo screening of Contractor personnel for those individuals who have proof of a --

(i) Current or recent national security clearances (within last three years);

(ii) Screening conducted by NASA within the last three years that meets or exceeds the screening requirements of the IT position; or

(iii) Screening conducted by the Contractor, within the last three years, that is equivalent to the NASA personnel screening procedures as approved by the Contracting Officer and concurred on by the CCS.

(d) The Contracting Officer may waive the requirements of paragraphs (b) and (c)(1) through (c)(3) upon request of the Contractor. The Contractor shall provide all relevant information requested by the Contracting Officer to support the waiver request.

(e) The Contractor shall contact the Contracting Officer for any documents, information, or forms necessary to comply with the requirements of this clause.

(f) The Contractor shall insert this clause, including this paragraph (f), in all subcontracts when the subcontractor is required to -

(1) Have physical or electronic access to NASA's computer systems, networks, or IT infrastructure; or

(2) Use information systems to generate, store, or exchange data with NASA or on behalf of NASA, regardless of whether the data resides on a NASA or a contractor's information system.

(END OF SECTION)

(END OF PART II)

PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACHMENTS

SECTION J - LIST OF ATTACHMENTS

Exhibit A - Installation-Accountable Government Property

Exhibit B - Contract Documentation Requirements

Exhibit C - Wage Determination No. 1994 - 2544, Revision No. 26 and Collective Bargaining Agreement Between Sverdrup Technology, Inc., and the International Brotherhood of Electrical Workers, AFL-CIO

Exhibit D - Department of Defense Contract Security Classification Specification (DD 254)

Exhibit E - Safety and Health Plan

Exhibit F - IT Security Plan

Exhibit G - Applicable Regulations, Statutes, Procedures

Exhibit H - Worker Qualifications

Exhibit I - Langley Form 322

Exhibit J - NASA LaRC Construction Inspection Manual

Exhibit K - Langley Form 251

Exhibit L - LaRC Building Layering Convention

Exhibit M - Mechanical Drafting Standards

Exhibit N - NASA LaRC Construction Management Manual

Exhibit O - Langley Form 252

Exhibit P - Standards & Procedures for Facilities and Utilities Electronic Database

Exhibit Q - Elevators

Exhibit R - Current & Projected Construction Support

Exhibit S - Inspection Task Order Estimate Form (Sample)

[END OF SECTION]

PART IV - REPRESENTATIONS AND INSTRUCTIONS

SECTION K - REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS

K.1 CERTIFICATE OF INDEPENDENT PRICE DETERMINATION (FAR 52.203-2) (APR 1985)

(a) The offeror certifies that--

(1) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or competitor relating to (i) those prices, (ii) the intention to submit an offer, or (iii) the methods or factors used to calculate the prices offered;

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror, directly or indirectly, to any other offeror or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory--

(1) Is the person in the offeror's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above

_____

_____

_____

[Insert full name of person(s) in the offeror's organization responsible for determining the prices offered in the bid or proposal, and the title of his or her position in the offeror's organization];

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above.

(c) If the offeror deletes or modifies subparagraph (a)(2) above, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

K.2 CERTIFICATION AND DISCLOSURE REGARDING PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (FAR 52.203-11) (APR 1991)

(a) The definitions and prohibitions contained in the clause, at FAR 52.203-12, Limitation on Payments to Influence Certain Federal Transactions, included in this solicitation, are hereby incorporated by reference in paragraph (b) of this certification.

(b) The offeror, by signing its offer, hereby certifies to the best of his or her knowledge and belief that on or after December 23, 1989,--

(1) No Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan, or cooperative agreement;

(2) If any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with this solicitation, the offeror shall complete and submit, with its offer, OMB standard form LLL, Disclosure of Lobbying Activities, to the Contracting Officer; and

(3) He or she will include the language of this certification in all subcontract awards at any tier and require that all recipients of subcontract awards in excess of $100,000 shall certify and disclose accordingly.

(c) Submission of this certification and disclosure is a prerequisite for making or entering into this contract imposed by section 1352, title 31, United States Code. Any person who makes an expenditure prohibited under this provision or who fails to file or amend the

disclosure form to be filed or amended by this provision, shall be subject to a civil penalty of not less than $10,000, and not more than $100,000, for each such failure.

K.3 TAXPAYER IDENTIFICATION (FAR 52.204-3) (OCT 1998)

(a) Definitions.

"Common parent," as used in this provision, means that corporate entity that owns or controls an affiliated group of corporations that files its Federal income tax returns on a consolidated basis, and of which the offeror is a member.

"Taxpayer Identification Number (TIN)," as used in this provision, means the number required by the Internal Revenue Service (IRS) to be used by the offeror in reporting income tax and other returns. The TIN may be either a Social Security Number or an Employer Identification Number.

(b) All offerors must submit the information required in paragraphs (d) through (f) of this provision to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325(d), reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M, and implementing regulations issued by the IRS. If the resulting contract is subject to the payment reporting requirements described in Federal Acquisition Regulation (FAR) 4.904, the failure or refusal by the offeror to furnish the information may result in a 31 percent reduction of payments otherwise due under the contract.

(c) The TIN may be used by the Government to collect and report on any delinquent amounts arising out of the offeror's relationship with the Government (31 U.S.C. 7701(c)(3)). If the resulting contract is subject to the payment reporting requirements described in FAR 4.904, the TIN provided hereunder may be matched with IRS records to verify the accuracy of the offeror's TIN.

(d) Taxpayer Identification Number (TIN).

[ ] TIN: _____.

[ ] TIN has been applied for.

[ ] TIN is not required because:

[ ] Offeror is a nonresident alien, foreign corporation, or foreign partnership that does not have income effectively connected with the conduct of a trade or business in the United States and does not have an office or place of business or a fiscal paying agent in the United States;

[ ] Offeror is an agency or instrumentality of a foreign government;

[ ] Offeror is an agency or instrumentality of the Federal Government.

(e) Type of organization.

[ ] Sole proprietorship;

[ ] Partnership;

[ ] Corporate entity (not tax-exempt);

[ ] Corporate entity (tax-exempt);

[ ] Government entity (Federal, State, or local);

[ ] Foreign government;

[ ] International organization per 26 CFR 1.6049-4;

[ ] Other _____.

(f) Common parent.

[ ] Offeror is not owned or controlled by a common parent as defined in paragraph (a) of this provision.

[ ] Name and TIN of common parent:

Name _____

TIN _____

K.4 CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS (FAR 52.209-5) (DEC 2001)

(a)(1) The Offeror certifies, to the best of its knowledge and belief, that-

(i) The Offeror and/or any of its Principals-

(A) Are [ ] are not [ ] presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(B) Have [ ] have not [ ], within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, state, or local) contract or subcontract; violation of Federal or state antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, or receiving stolen property; and

(C) Are [ ] are not [ ] presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in paragraph (a)(1)(i)(B) of this provision.

(ii) The Offeror has [ ] has not [ ], within a three-year period preceding this offer, had one or more contracts terminated for default by any Federal agency.

(2) "Principals," for the purposes of this certification, means officers; directors; owners; partners; and, persons having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a subsidiary, division, or business segment, and similar positions).

This Certification Concerns a Matter Within the Jurisdiction of an Agency of the United States and the Making of a False, Fictitious, or Fraudulent Certification May Render the Maker Subject to Prosecution Under Section 1001, Title 18, United States Code.

(b) The Offeror shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) A certification that any of the items in paragraph (a) of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the certification will be considered in connection with a determination of the Offeror's responsibility. Failure of the Offeror to furnish a certification or provide such additional information as requested by the Contracting Officer may render the Offeror nonresponsible.

(d) Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a) of this provision. The knowledge and information of an Offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

(e) The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Offeror knowingly rendered an erroneous certification, in addition to other remedies available to the Government, the Contracting Officer may terminate the contract resulting from this solicitation for default.

K.5 SMALL BUSINESS PROGRAM REPRESENTATIONS (FAR 52.219-1) (APR 2002) (ALTERNATE I) (APR 2002)

(a) (1) The North American Industry Classification System (NAICS) code for this acquisition is 541350.

(2) The small business size standard is $6.0M.

(3) The small business size standard for a concern which submits an offer in its own name, other than on a construction or service contract, but which proposes to furnish a product which it did not itself manufacture, is 500 employees.

(b) Representations. (1) The offeror represents as part of its offer that it [ ] is, [ ] is not a small business concern.

(2) [Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.] The offeror represents, for general statistical purposes, that it [ ] is, [ ] is not, a small disadvantaged business concern as defined in 13 CFR 124.1002.

(3) [Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.] The offeror represents as part of its offer that it [ ] is, [ ] is not a women-owned small business concern.

(4) [Complete only if the offeror represented itself as a small business concern in paragraph (b)(1) of this provision.] The offeror represents as part of its offer that it [ ] is, [ ] is not a veteran-owned small business concern.

(5) [Complete only if the offeror represented itself as a veteran-owned small business concern in paragraph (b)(4) of this provision.] The offeror represents as part of its offer that it [ ] is, [ ] is not a service-disabled veteran-owned small business concern.

(6) [Complete only if offeror represented itself as a small business concern in paragraph (b)(1) of this provision.] The offeror represents, as part of its offer, that--

(i) It [ ] is, [ ] is not a HUBZone small business concern listed, on the date of this representation, on the List of Qualified HUBZone Small Business Concerns maintained by the Small Business

Administration, and no material change in ownership and control, principal office, or HUBZone employee percentage has occurred since it was certified by the Small Business Administration in accordance with 13 CFR Part 126; and

(ii) It [ ] is, [ ] is not a joint venture that complies with the requirements of 13 CFR Part 126, and the representation in paragraph (b)(6)(i) of this provision is accurate for the HUBZone small business concern or concerns that are participating in the joint venture. [The offeror shall enter the name or names of the HUBZone small business concern or concerns that are participating in the joint venture: _____.] Each HUBZone small business concern participating in the joint venture shall submit a separate signed copy of the HUBZone representation.

(7) [Complete if offeror represented itself as disadvantaged in paragraph (b)(2) of this provision.] The offeror shall check the category in which its ownership falls:

_____ Black American.

_____ Hispanic American.

_____ Native American (American Indians, Eskimos, Aleuts, or Native Hawaiians).

_____ Asian-Pacific American (persons with origins from Burma, Thailand, Malaysia, Indonesia, Singapore, Brunei, Japan, China, Taiwan, Laos, Cambodia (Kampuchea), Vietnam, Korea, The Philippines, U.S. Trust Territory of the Pacific Islands (Republic of Palau), Republic of the Marshall Islands, Federated States of Micronesia, the Commonwealth of the Northern Mariana Islands, Guam, Samoa, Macao, Hong Kong, Fiji, Tonga, Kiribati, Tuvalu, or Nauru).

_____ Subcontinent Asian (Asian-Indian) American (persons with origins from India, Pakistan, Bangladesh, Sri Lanka, Bhutan, the Maldives Islands, or Nepal).

_____ Individual/concern, other than one of the preceding.

(c) Definitions. As used in this provision--

"Service-disabled veteran-owned small business concern"--

(1) Means a small business concern--

(i) Not less than 51 percent of which is owned by one or more service-disabled veterans or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more service-disabled veterans; and

(ii) The management and daily business operations of which are controlled by one or more service-disabled veterans or, in the case of a veteran with permanent and severe disability, the spouse or permanent caregiver of such veteran.

(2) Service-disabled veteran means a veteran, as defined in 38 U.S.C. 101(2), with a disability that is service-connected, as defined in 38 U.S.C. 101(16).

"Small business concern" means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria in 13 CFR part 121 and the size standard in paragraph (a) of this provision.

"Veteran-owned small business concern" means a small business concern--

(1) Not less than 51 percent of which is owned by one or more veterans (as defined at 38 U.S.C. 101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

"Women-owned small business concern" means a small business concern--

(1) That is at least 51 percent owned by one or more women; or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women; and

(2) Whose management and daily business operations are controlled by one or more women.

(d) Notice. (1) If this solicitation is for supplies and has been set aside, in whole or in part, for small business concerns, then the clause in this solicitation providing notice of the set-aside contains restrictions on the source of the end items to be furnished.

(2) Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a small, HUBZone small, small disadvantaged, or women- owned small business concern in order to obtain a contract to be awarded under the preference programs established pursuant to section 8(a), 8(d), 9, or 15 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, shall--

(i) Be punished by imposition of fine, imprisonment, or both;

(ii) Be subject to administrative remedies, including suspension and debarment; and

(iii) Be ineligible for participation in programs conducted under the authority of the Act.

K.6 PREVIOUS CONTRACTS AND COMPLIANCE REPORTS (FAR 52.222-22) (FEB 1999)

The offeror represents that--

(a) It [ ] has, [ ] has not participated in a previous contract or subcontract subject the Equal Opportunity clause of this solicitation;

(b) It [ ] has, [ ] has not filed all required compliance reports; and

(c) Representations indicating submission of required compliance reports, signed by proposed subcontractors, will be obtained before subcontract awards.

K.7 AFFIRMATIVE ACTION COMPLIANCE (FAR 52.222-25) (APR 1984)

The offeror represents that--

(a) It [ ] has developed and has on file, [ ] has not developed and does not have on file, at each establishment, affirmative action programs required by the rules and regulations of the Secretary of Labor (41 CFR 60-1 and 60-2), or (b) It [ ] has not previously had contracts subject to the written affirmative action programs requirement of the rules and regulations of the Secretary of Labor.

K.8 COMPLIANCE WITH VETERANS' EMPLOYMENT REPORTING REQUIREMENTS (FAR 52.222-38) (DEC 2001)

By submission of its offer, the offeror represents that, if it is subject to the reporting requirements of 38 U.S.C. 4212(d) (i.e., if it has any contract containing Federal Acquisition Regulation clause 52.222-37, Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans), it has submitted the most recent VETS-100 Report required by that clause.

K.9 RECOVERED MATERIAL CERTIFICATION (FAR 52.223-4) (OCT 1997)

As required by the Resource Conservation and Recovery Act of 1976 (42 U.S.C 6962(c)(3)(A)(i)), the offeror certifies, by signing this offer, that the percentage of recovered materials to be used in the performance of the contract will be at least the amount required by the applicable contract specifications.

K.10 CERTIFICATION OF TOXIC CHEMICAL RELEASE REPORTING (52.223-13) (AUG 2003)

(a) Executive Order 13148, of April 21, 2000, Greening the Government through Leadership in Environmental Management, requires submission of this certification as a prerequisite for contract award.

(b) By signing this offer, the offeror certifies that-

(1) As the owner or operator of facilities that will be used in the performance of this contract that are subject to the filing and reporting requirements described in section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) (42 U.S.C. 11023) and section 6607 of the Pollution Prevention Act of 1990 (PPA) (42 U.S.C. 13106), the offeror will file and continue to file for such facilities for the life of the contract the Toxic Chemical Release Inventory Form (Form R) as described in sections 313(a) and (g) of EPCRA and section 6607 of PPA; or

(2) None of its owned or operated facilities to be used in the performance of this contract is subject to the Form R filing and reporting requirements because each such facility is exempt for at least one of the following reasons: [Check each block that is applicable.]

[ ] (i) The facility does not manufacture, process, or otherwise use any toxic chemicals listed in 40 CFR 372.65;

[ ] (ii) The facility does not have 10 or more fulltime employees as specified in section 313(b)(1)(A) of EPCRA, 42 U.S.C. 11023(b)(1)(A);

[ ] (iii) The facility does not meet the reporting thresholds of toxic chemicals established under section 313(f) of EPCRA, 42 U.S.C. 11023(f) (including the alternate thresholds at 40 CFR 372.27, provided an appropriate certification form has been filed with EPA);

[ ] (iv) The facility does not fall within the following Standard Industrial Classification (SIC) codes or their corresponding North American Industry Classification System sectors:

(A) Major group code 10 (except 1011, 1081, and 1094.

(B) Major group code 12 (except 1241).

(C) Major group codes 20 through 39.

(D) Industry code 4911, 4931, or 4939 (limited to facilities that combust coal and/or oil for the purpose of generating power for distribution in commerce).

(E) Industry code 4953 (limited to facilities regulated under the Resource Conservation and Recovery Act, Subtitle C (42 U.S.C. 6921, et seq.), or 5169, or 5171, or 7389 (limited to facilities primarily engaged in solvent recovery services on a contract or fee basis); or

[ ] (v) The facility is not located in the United States or its outlying areas.

[END OF SECTION]

EXHIBIT A - INSTALLATION ACCOUNTABLE GOVERNMENT PROPERTY

Item#	Manufacture/Description	EQUIPMENT TYPE	P/N - S/N	ECN - GOV	Qty	Date of Pur.	Value
1	Trimble 5605DR200+ Total Sta.	Special Test	63521348		1	11/03/03	$ 10,000
2a	Tripod Data Systems Ranger- 133T with Acc.	Special Test	H-076-331-133T-032		1	11/03/03	$ 2,120
2b	Dutch Hill Fiberglass Tripod	Special Test	GPT2000A		1	11/03/03	$ -
2c	SECO 8.5' Dual-Graduated Prism Pole	Special Test	5700-10		1	11/03/03	$ -
3	Nikon Total Field Station	Special Test			1	12/15/98	$ 8,000
4	Spatial data workstaions	Special Test		from GIS	4		$ 8,000
5	SECO Single Tilting Prism w/ Target	General Purpose	6422-02-YLB		1	11/03/03	$ -
6	Leveling Micrometer	General Purpose			1	12/15/98	$ 500
7	File Cabinet	General Purpose		56	1		$ 135
8	File Cabinet	General Purpose		54	1		$ 71
9	Drawing Files, 5 Drawer	General Purpose		1901	1		$ 300
10	Drawing Files, 5 Drawer	General Purpose		1902	1		$ 300
11	Level Precision w/Tripod	General Purpose	25275	1624	1		$ 600
12	Level Rod	General Purpose		1624a	1		$ -
13	Rod w/Cover,	General Purpose		1625a	1		$ -
14	Centering Platform, Topcon	General Purpose	6306	1625b	1		$ -
15	Tripod (Extra)	General Purpose		1629a	1		$ -
16	Tribrach, Nikon	General Purpose	670003	1629b	1		$ -
17	Triple prism Mount w/Refl.	General Purpose	676PSM100	1629c	1		$ -
18	Soft Case (1 of 2)	General Purpose	6PSM0155	1629e	1		$ -
19	Soft Case (2 of 2)	General Purpose	6PSM015	1629f	1		$ -
20	Line Tracer, Pipe & Cable	General Purpose	015839 / ECN 08	1640	1		$ 1,898
21	Level Auto, Leitz	General Purpose	09222 / ECN 054	1648	1		$ 1,435
22	Inductive Clamp, Metro-Tech	General Purpose		1652	1		$ 235
23	Single Prism Mount w/Refl.	General Purpose	6PSM100	1654b	1		$ -
24	Mini-Prism Set, Nikon	General Purpose	6920205	1654c	1		$ -
25	Soft Case (1 of 2)	General Purpose		1654f &e	2		$ -
26	Kurta Tablet	General Purpose	90035057	G076022	1		$ 2,117
27	Hewlett Packard Printer/Plotter	General Purpose	C3198A - ESA5C03176	1429114	1	05/30/96	$ 9,875
						TOTAL	$ 45,586

EXHIBIT B - CONTRACT DOCUMENTATION REQUIREMENTS

I. DOCUMENTATION PREPARATION/SUBMISSION INSTRUCTIONS

There are significant reporting requirements in each Element of the SOW that are not repeated in this exhibit. The Contractor is responsible for ensuring that all reporting requirements of the SOW are met in a timely and efficient manner. The reporting requirements detailed below are required in addition to those specified in the SOW.

1. Monthly Financial Management Report (CLIN 01 ONLY)

a. The Contractor shall submit a monthly financial management report as provided by the NFS 1852.242-73 clause entitled "NASA Financial Management Reporting." This report shall be submitted utilizing NASA Form 533M, Monthly Contractor Financial Management Report, in accordance with submission instructions contained on the reverse side of the form.

b. For this task order contract, a 533M shall be provided for the levels indicated below:

1. Each Authorized Cost Task

2. Contract Total. (Column 9b shall reflect total estimated cost of $# plus fixed fee of $#.)

3. Due not later than the 10th operating day following the close of the Contractor's accounting period being reported.

4. (Do not change the percentages shown below without concurrence of Deputy CFO-Reference FMM 9061-5A).

Each NF533M shall include a narrative explanation for variances exceeding +-5 percent between estimated dollars shown in the prior month and actual dollars shown in the current month at the total contract level. (For example, the estimated dollars shown for June in column 8a. in the May 533M and the actual June dollars shown in column 7a. in the June 533M.)

c. As a minimum, the following categories specified below shall be reported:

Direct Labor Hours
Direct Labor Dollars

Other Direct Costs:
- Travel
- Training
- Materials/Equipment
- Subcontracts
- Other ODCs

Total Other Direct Costs

Estimated Cost
Fixed Fee
Cost-Plus-Fixed Fee

[May be applicable to all contract types. If categories are unusual or period of delivery differs, obtain concurrence of Deputy CFO and cognizant Program Manager. See NPD 9501.1G.]

2. **Final Reports** -- Each task order may require the Contractor to submit a final report which documents and summarizes the results.

3. **Safety Reports** -- The Contractor shall submit safety reports to the LaRC Safety and Facility Assurance Office (SFAO). These reports shall be submitted on a quarterly basis. The Safety Report shall include the hours worked on the contract and the number of fatalities, lost time cases, OSHA recordable incidents and first aid cases which have occurred during the past quarter). NOTE: SFAO has developed a web-based system entitled "Contractor Monthly Accident Reporting" (CMAR) located at http://cmar.larc.nasa.gov/login.cfm If you choose to submit your information electronically via CMAR, no additional hard-copy reports are required. Please contact the responsible NASA official identified at the site for additional information regarding access to the system.

4. **Notice of Violation Response** -- The Contractor shall respond to any Notice of Violation (NOV) issued for safety violations to the prime itself or its' subcontractors within three working days of issuance. The response should include cause for violation; mitigation of impact, if applicable; planned prevention of recurrence. Response shall be submitted to the issuer of the NOV.

5. **IT Security Plan** - The Contractor shall submit the IT Security Plan required by contract clause NFS 1852.204-76 Security Requirements for Unclassified Information Technology Resources for Contracting Officer approval no later than 30 days after award.

6. **Annual IT Security Training Report** - The purpose of this report is to obtain confirmation that IT security training for contractor employees required under paragraph (e) of NFS clause 1852.204-76, Security Requirements for Unclassified Information Technology Resources, has been completed by all individuals required to do so. NASA requires that this annual training be completed by 100% of the appropriate employees no later than June 30 each year. Accordingly, a report that includes the information listed below shall be submitted to the Contracting Officer no later than June 30 of each calendar year, so long as the period of performance of the contract has not expired prior to June 30th.

Report Content: (1) the number of employees requiring IT security training in accordance with the contract clause (i.e., in accordance with NPG 2810.1, which requires such training for all "employees who have access to NASA computer systems and networks that process, store, or transmit information"); (2) the number of those employees in item (1) that have completed the annual training as of June 30th; (3) whether the NASA on-line training system was used (use of the NASA on-line system is optional); and (4) a plan of action with milestones to reach 100% in item (2) if that level has not been achieved by June 30th.

7. **Conformable Wage Rate Agreement** - Within 15 operating days after the effective date of the contract, the Contractor shall submit a report confirming conformable wage rate agreement as this subject is addressed in the clause entitled "Service Contract Act of 1965," for those individuals employed by the Contractor who are covered by the Service Contract Act, but are not listed in Exhibit D.

8. **Collective Bargaining Agreements** - The Contractor shall provide the Contracting Officer with copies of any collective bargaining agreements, and amendments thereto, which arise during the course of the contract and which apply to Contractor employees assigned to the contract.

9. **Federal Contractor Veterans Employment Report** - In compliance with Clause 52.222-37, Employment Reports on Disabled Veterans and Veterans of the Vietnam Era, the Contractor shall submit the Federal Contractor Veterans Employment Reports (VETS-100) as required by this clause.

10. **Evidence of Insurance** - The Contractor shall submit evidence of the insurance coverage, required by the NASA Clause 1852.228- 75 entitled "Minimum Insurance Coverage" (i.e., a Certificate of Insurance or other confirmation), to the Contracting Officer prior to performing under this contract. The Contractor shall also present such evidence to the Contracting Officer prior to commencement of performance under any options exercised, if applicable.

II. DOCUMENT DISTRIBUTION REQUIREMENTS

A. Unless otherwise specified elsewhere in this contract, reports and other documentation shall be submitted F.O.B. destination as specified below, addressed as follows:

National Aeronautics and Space Administration
Langley Research Center
Attn: , Mail Stop
Contract NNL04_____
Hampton, VA 23681-2199

B. The following letter codes designate the recipients of reports and other documentation which are required to be delivered prepaid to Langley Research Center by the Contractor:

1. A--Contract Specialist, Mail Stop 126

2. B--Contracting Officer Technical Representative, Mail Stop 447

3. C--Cost Accounting, NF533@nasa.gov

4. D--Safety and Facility Assurance Office, Mail Stop 421

5. E- Industry Assistance Representative, Mail Stop 144

6. F--Center Information Technology Security Manager (CITSM), Mail Stop 124

7. G--According to instructions on form

8. H--As required by Task Order

C. The following are the distribution requirements for reports and other documentation required to be delivered f.o.b. destination. The numeral following the letter code specifying the number of copies to be provided:

DOCUMENT:	DISTRIBUTION
1. Monthly Financial Management Report (CLIN 01 ONLY)	A-1, B-1, C-2
2. Final Report	A-1, B-2, H
3. Safety Reports	A-1, B-1, D-1
4. Notice of Violation Responses	A-1, B-1, D-1
5. IT Security Plan	A-1, B-1, F-1
6. Annual IT Security Training Report	A-1, B-1, F-1
7. Conformable Wage Rate Agreement	A-1, B-1, E-1
8. Collective Bargaining Agreement	A-1, B-1, E-1
9. Federal Contractor Veterans Employment Report (VETS-100)	G
10. Evidence of Insurance	A-1, B-1, D-1

D. When the Contract Specialist (A) is not designated above to receive a copy of a report or document, the Contractor shall furnish a copy of the report/document transmittal letter to the Contract Specialist. If delegated, the Contractor shall also furnish a copy of the transmittal letter and a copy of each Financial Management Report to the delegated Administrative Contracting Officer of the cognizant DoD (or other agency) contract administrative services component.

EXHIBIT C - WAGE DETERMINATION

94-2544 VA, NORFOLK 08/05/03
FOR OFFICIAL USE ONLY BY FEDERAL AGENCIES PARTICIPATING IN MOU WITH DOL

William W.Gross
Director

Division of
Wage Determinations

WASHINGTON D.C. 20210

Wage Determination No.: 1994-2544
Revision No.: 26
Date Of Last Revision: 07/29/2003

States: North Carolina, Virginia

Area: North Carolina Counties of Camden, Chowan, Currituck, Gates, Pasquotank, Perquimans
Virginia Counties of Chesapeake, Gloucester, Hampton, Isle of Wight, James City, Mathews, Newport News, Norfolk, Poquoson, Portsmouth, Southampton, Suffolk, Surry, Virginia Beach, Williamsburg, York

Fringe Benefits Required Follow the Occupational Listing

OCCUPATION CODE - TITLE	MINIMUM WAGE RATE
01000 - Administrative Support and Clerical Occupations	
01011 - Accounting Clerk I	8.38
01012 - Accounting Clerk II	10.58
01013 - Accounting Clerk III	13.17
01014 - Accounting Clerk IV	14.28
01030 - Court Reporter	12.94
01050 - Dispatcher, Motor Vehicle	12.63
01060 - Document Preparation Clerk	10.68
01070 - Messenger (Courier)	8.68
01090 - Duplicating Machine Operator	9.93
01110 - Film/Tape Librarian	10.56
01115 - General Clerk I	7.94
01116 - General Clerk II	9.77
01117 - General Clerk III	12.15
01118 - General Clerk IV	13.59
01120 - Housing Referral Assistant	16.42
01131 - Key Entry Operator I	9.13
01132 - Key Entry Operator II	11.49
01191 - Order Clerk I	11.13
01192 - Order Clerk II	14.56
01261 - Personnel Assistant (Employment) I	12.18
01262 - Personnel Assistant (Employment) II	14.07
01263 - Personnel Assistant (Employment) III	14.87
01264 - Personnel Assistant (Employment) IV	17.03
01270 - Production Control Clerk	17.78
01290 - Rental Clerk	12.49
01300 - Scheduler, Maintenance	13.00
01311 - Secretary I	13.00
01312 - Secretary II	15.14
01313 - Secretary III	17.27
01314 - Secretary IV	20.25
01315 - Secretary V	21.26
01320 - Service Order Dispatcher	12.63
01341 - Stenographer I	10.51
01342 - Stenographer II	12.90
01400 - Supply Technician	19.04
01420 - Survey Worker (Interviewer)	12.02
01460 - Switchboard Operator-Receptionist	9.59
01510 - Test Examiner	14.39

01520 - Test Proctor	14.39
01531 - Travel Clerk I	9.92
01532 - Travel Clerk II	10.59
01533 - Travel Clerk III	11.30
01611 - Word Processor I	11.58
01612 - Word Processor II	13.96
01613 - Word Processor III	14.61
03000 - Automatic Data Processing Occupations	
03010 - Computer Data Librarian	9.41
03041 - Computer Operator I	11.53
03042 - Computer Operator II	13.32
03043 - Computer Operator III	16.50
03044 - Computer Operator IV	19.12
03045 - Computer Operator V	20.32
03071 - Computer Programmer I (1)	19.24
03072 - Computer Programmer II (1)	21.77
03073 - Computer Programmer III (1)	25.96
03074 - Computer Programmer IV (1)	27.62
03101 - Computer Systems Analyst I (1)	25.89
03102 - Computer Systems Analyst II (1)	27.62
03103 - Computer Systems Analyst III (1)	27.62
03160 - Peripheral Equipment Operator	11.53
05000 - Automotive Service Occupations	
05005 - Automotive Body Repairer, Fiberglass	18.20
05010 - Automotive Glass Installer	16.60
05040 - Automotive Worker	16.60
05070 - Electrician, Automotive	17.38
05100 - Mobile Equipment Servicer	15.00
05130 - Motor Equipment Metal Mechanic	18.20
05160 - Motor Equipment Metal Worker	16.60
05190 - Motor Vehicle Mechanic	18.20
05220 - Motor Vehicle Mechanic Helper	14.15
05250 - Motor Vehicle Upholstery Worker	15.78
05280 - Motor Vehicle Wrecker	16.60
05310 - Painter, Automotive	17.38
05340 - Radiator Repair Specialist	15.78
05370 - Tire Repairer	13.37
05400 - Transmission Repair Specialist	18.20
07000 - Food Preparation and Service Occupations	
(not set) - Food Service Worker	7.92
07010 - Baker	9.05
07041 - Cook I	8.43
07042 - Cook II	9.32
07070 - Dishwasher	7.42
07130 - Meat Cutter	11.54
07250 - Waiter/Waitress	7.56
09000 - Furniture Maintenance and Repair Occupations	
09010 - Electrostatic Spray Painter	20.27
09040 - Furniture Handler	13.34
09070 - Furniture Refinisher	16.03
09100 - Furniture Refinisher Helper	13.05
09110 - Furniture Repairer, Minor	14.56
09130 - Upholsterer	16.03
11030 - General Services and Support Occupations	
11030 - Cleaner, Vehicles	8.43
11060 - Elevator Operator	8.36
11090 - Gardener	10.19
11121 - House Keeping Aid I	7.41
11122 - House Keeping Aid II	9.50
11150 - Janitor	8.96
11210 - Laborer, Grounds Maintenance	9.52
11240 - Maid or Houseman	7.41
11270 - Pest Controller	10.57
11300 - Refuse Collector	10.02

11330 - Tractor Operator	9.71
11360 - Window Cleaner	9.50
12000 - Health Occupations	
12020 - Dental Assistant	11.11
12040 - Emergency Medical Technician (EMT)/Paramedic/Ambulance Driver	13.79
12071 - Licensed Practical Nurse I	10.98
12072 - Licensed Practical Nurse II	12.32
12073 - Licensed Practical Nurse III	13.78
12100 - Medical Assistant	10.39
12130 - Medical Laboratory Technician	12.14
12160 - Medical Record Clerk	11.99
12190 - Medical Record Technician	13.15
12221 - Nursing Assistant I	7.67
12222 - Nursing Assistant II	8.63
12223 - Nursing Assistant III	9.42
12224 - Nursing Assistant IV	10.56
12250 - Pharmacy Technician	11.84
12280 - Phlebotomist	11.71
12311 - Registered Nurse I	19.72
12312 - Registered Nurse II	23.42
12313 - Registered Nurse II, Specialist	23.42
12314 - Registered Nurse III	28.34
12315 - Registered Nurse III, Anesthetist	28.34
12316 - Registered Nurse IV	33.96
13000 - Information and Arts Occupations	
13002 - Audiovisual Librarian	14.23
13011 - Exhibits Specialist I	15.81
13012 - Exhibits Specialist II	19.21
13013 - Exhibits Specialist III	21.33
13041 - Illustrator I	17.63
13042 - Illustrator II	21.42
13043 - Illustrator III	23.78
13047 - Librarian	21.20
13050 - Library Technician	12.60
13071 - Photographer I	11.73
13072 - Photographer II	15.55
13073 - Photographer III	18.89
13074 - Photographer IV	20.98
13075 - Photographer V	25.39
15000 - Laundry, Dry Cleaning, Pressing and Related Occupations	
15010 - Assembler	6.95
15030 - Counter Attendant	6.95
15040 - Dry Cleaner	8.75
15070 - Finisher, Flatwork, Machine	6.95
15090 - Presser, Hand	6.95
15100 - Presser, Machine, Drycleaning	6.95
15130 - Presser, Machine, Shirts	6.95
15160 - Presser, Machine, Wearing Apparel, Laundry	6.95
15190 - Sewing Machine Operator	9.35
15220 - Tailor	9.91
15250 - Washer, Machine	7.51
19000 - Machine Tool Operation and Repair Occupations	
19010 - Machine-Tool Operator (Toolroom)	18.33
19040 - Tool and Die Maker	20.31
21000 - Material Handling and Packing Occupations	
21010 - Fuel Distribution System Operator	15.62
21020 - Material Coordinator	17.78
21030 - Material Expediter	17.78
21040 - Material Handling Laborer	9.75
21050 - Order Filler	9.89
21071 - Forklift Operator	13.56
21080 - Production Line Worker (Food Processing)	13.08
21100 - Shipping/Receiving Clerk	11.02
21130 - Shipping Packer	12.10

21140 - Store Worker I	9.87
21150 - Stock Clerk (Shelf Stocker; Store Worker II)	12.41
21210 - Tools and Parts Attendant	14.93
21400 - Warehouse Specialist	14.36
23000 - Mechanics and Maintenance and Repair Occupations	
23010 - Aircraft Mechanic	20.53
23040 - Aircraft Mechanic Helper	15.13
23050 - Aircraft Quality Control Inspector	21.44
23060 - Aircraft Servicer	16.87
23070 - Aircraft Worker	17.74
23100 - Appliance Mechanic	17.63
23120 - Bicycle Repairer	13.37
23125 - Cable Splicer	20.32
23130 - Carpenter, Maintenance	16.03
23140 - Carpet Layer	17.61
23160 - Electrician, Maintenance	18.96
23181 - Electronics Technician, Maintenance I	16.46
23182 - Electronics Technician, Maintenance II	16.84
23183 - Electronics Technician, Maintenance III	18.04
23260 - Fabric Worker	14.56
23290 - Fire Alarm System Mechanic	16.79
23310 - Fire Extinguisher Repairer	13.84
23340 - Fuel Distribution System Mechanic	18.95
23370 - General Maintenance Worker	15.31
23400 - Heating, Refrigeration and Air Conditioning Mechanic	16.79
23430 - Heavy Equipment Mechanic	16.79
23440 - Heavy Equipment Operator	16.79
23460 - Instrument Mechanic	16.79
23470 - Laborer	10.02
23500 - Locksmith	18.17
23530 - Machinery Maintenance Mechanic	18.43
23550 - Machinist, Maintenance	16.79
23580 - Maintenance Trades Helper	13.05
23640 - Millwright	20.58
23700 - Office Appliance Repairer	16.03
23740 - Painter, Aircraft	18.24
23760 - Painter, Maintenance	16.03
23790 - Pipefitter, Maintenance	17.37
23800 - Plumber, Maintenance	16.58
23820 - Pneudraulic Systems Mechanic	16.79
23850 - Rigger	16.79
23870 - Scale Mechanic	15.31
23890 - Sheet-Metal Worker, Maintenance	16.79
23910 - Small Engine Mechanic	15.31
23930 - Telecommunication Mechanic I	16.79
23931 - Telecommunication Mechanic II	20.16
23950 - Telephone Lineman	16.79
23960 - Welder, Combination, Maintenance	16.79
23965 - Well Driller	16.79
23970 - Woodcraft Worker	16.79
23980 - Woodworker	13.84
24000 - Personal Needs Occupations	
24570 - Child Care Attendant	7.15
24580 - Child Care Center Clerk	11.06
24600 - Chore Aid	6.58
24630 - Homemaker	10.63
25000 - Plant and System Operation Occupations	
25010 - Boiler Tender	17.76
25040 - Sewage Plant Operator	17.81
25070 - Stationary Engineer	17.76
25190 - Ventilation Equipment Tender	13.05
25210 - Water Treatment Plant Operator	17.81
27000 - Protective Service Occupations	
(not set) - Police Officer	17.47

27004 - Alarm Monitor	11.95
27006 - Corrections Officer	13.55
27010 - Court Security Officer	14.51
27040 - Detention Officer	13.55
27070 - Firefighter	13.99
27101 - Guard I	8.94
27102 - Guard II	10.70
28000 - Stevedoring/Longshoremen Occupations	
28010 - Blocker and Bracer	15.07
28020 - Hatch Tender	15.07
28030 - Line Handler	15.07
28040 - Stevedore I	15.44
28050 - Stevedore II	16.96
29000 - Technical Occupations	
21150 - Graphic Artist	18.24
29010 - Air Traffic Control Specialist, Center (2)	29.10
29011 - Air Traffic Control Specialist, Station (2)	20.07
29012 - Air Traffic Control Specialist, Terminal (2)	22.09
29023 - Archeological Technician I	13.01
29024 - Archeological Technician II	14.63
29025 - Archeological Technician III	18.07
29030 - Cartographic Technician	19.12
29035 - Computer Based Training (CBT) Specialist/ Instructor	25.38
29040 - Civil Engineering Technician	18.89
29061 - Drafter I	11.46
29062 - Drafter II	12.90
29063 - Drafter III	16.21
29064 - Drafter IV	19.70
29081 - Engineering Technician I	15.58
29082 - Engineering Technician II	16.67
29083 - Engineering Technician III	20.54
29084 - Engineering Technician IV	24.87
29085 - Engineering Technician V	29.05
29086 - Engineering Technician VI	35.89
29090 - Environmental Technician	16.43
29100 - Flight Simulator/Instructor (Pilot)	27.62
29160 - Instructor	19.90
29210 - Laboratory Technician	14.86
29240 - Mathematical Technician	19.70
29361 - Paralegal/Legal Assistant I	12.85
29362 - Paralegal/Legal Assistant II	15.60
29363 - Paralegal/Legal Assistant III	19.09
29364 - Paralegal/Legal Assistant IV	23.09
29390 - Photooptics Technician	19.70
29480 - Technical Writer	20.56
29491 - Unexploded Ordnance (UXO) Technician I	18.49
29492 - Unexploded Ordnance (UXO) Technician II	22.37
29493 - Unexploded Ordnance (UXO) Technician III	26.81
29494 - Unexploded (UXO) Safety Escort	18.49
29495 - Unexploded (UXO) Sweep Personnel	18.49
29620 - Weather Observer, Senior (3)	18.44
29621 - Weather Observer, Combined Upper Air and Surface Programs (3)	17.04
29622 - Weather Observer, Upper Air (3)	17.04
31000 - Transportation/ Mobile Equipment Operation Occupations	
31030 - Bus Driver	10.39
31260 - Parking and Lot Attendant	7.51
31290 - Shuttle Bus Driver	10.10
31300 - Taxi Driver	10.29
31361 - Truckdriver, Light Truck	10.10
31362 - Truckdriver, Medium Truck	11.06
31363 - Truckdriver, Heavy Truck	14.64
31364 - Truckdriver, Tractor-Trailer	14.64
99000 - Miscellaneous Occupations	
99020 - Animal Caretaker	7.99

99030 - Cashier	7.67
99041 - Carnival Equipment Operator	10.00
99042 - Carnival Equipment Repairer	10.49
99043 - Carnival Worker	7.12
99050 - Desk Clerk	8.10
99095 - Embalmer	17.93
99300 - Lifeguard	8.88
99310 - Mortician	21.33
99350 - Park Attendant (Aide)	11.14
99400 - Photofinishing Worker (Photo Lab Tech., Darkroom Tech)	8.22
99500 - Recreation Specialist	13.50
99510 - Recycling Worker	12.27
99610 - Sales Clerk	8.88
99620 - School Crossing Guard (Crosswalk Attendant)	9.62
99630 - Sport Official	7.72
99658 - Survey Party Chief (Chief of Party)	13.67
99659 - Surveying Technician (Instr. Person/Surveyor Asst./Instr.)	12.43
99660 - Surveying Aide	8.54
99690 - Swimming Pool Operator	10.63
99720 - Vending Machine Attendant	10.43
99730 - Vending Machine Repairer	12.22
99740 - Vending Machine Repairer Helper	10.43

ALL OCCUPATIONS LISTED ABOVE RECEIVE THE FOLLOWING BENEFITS:

HEALTH & WELFARE: Life, accident, and health insurance plans, sick leave, pension plans, civic and personal leave, severance pay, and savings and thrift plans. Minimum employer contributions costing an average of $2.56 per hour computed on the basis of all hours worked by service employees employed on the contract.

VACATION: 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 8 years, and 4 weeks after 15 years. Length of service includes the whole span of continuous service with the present contractor or successor, wherever employed, and with the predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 29 CFR 4.173)

HOLIDAYS: A minimum of ten paid holidays per year: New Year's Day, Martin Luther King Jr.'s Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day, and Christmas Day. (A contractor may substitute for any of the named holidays another day off with pay in accordance with a plan communicated to the employees involved.) (See 29 CFR 4.174)

THE OCCUPATIONS WHICH HAVE PARENTHESES AFTER THEM RECEIVE THE FOLLOWING BENEFITS (as numbered):

1) Does not apply to employees employed in a bona fide executive, administrative, or professional capacity as defined and delineated in 29 CFR 541. (See CFR 4.156)

2) APPLICABLE TO AIR TRAFFIC CONTROLLERS ONLY - NIGHT DIFFERENTIAL: An employee is entitled to pay for all work performed between the hours of 6:00 P.M. and 6:00 A.M. at the rate of basic pay plus a night pay differential amounting to 10 percent of the rate of basic pay.

3) WEATHER OBSERVERS - NIGHT PAY & SUNDAY PAY: If you work at night as part of a regular tour of duty, you will earn a night differential and receive an additional 10% of basic pay for any hours worked between 6pm and 6am. If you are a full-time employed (40 hours a week) and Sunday is part of your regularly scheduled workweek, you are paid at your rate of basic pay plus a Sunday premium of 25% of your basic rate for each hour of Sunday work which is not overtime (i.e. occasional work on Sunday outside the normal tour of duty is considered overtime work).

HAZARDOUS PAY DIFFERENTIAL: An 8 percent differential is applicable to employees

employed in a position that represents a high degree of hazard when working with or in close proximity to ordinance, explosives, and incendiary materials. This includes work such as screening, blending, dying, mixing, and pressing of sensitive ordance, explosives, and pyrotechnic compositions such as lead azide, black powder and photoflash powder. All dry-house activities involving propellants or explosives. Demilitarization, modification, renovation, demolition, and maintenance operations on sensitive ordnance, explosives and incendiary materials. All operations involving regrading and cleaning of artillery ranges.

A 4 percent differential is applicable to employees employed in a position that represents a low degree of hazard when working with, or in close proximity to ordance, (or employees possibly adjacent to) explosives and incendiary materials which involves potential injury such as laceration of hands, face, or arms of the employee engaged in the operation, irritation of the skin, minor burns and the like; minimal damage to immediate or adjacent work area or equipment being used. All operations involving, unloading, storage, and hauling of ordance, explosive, and incendiary ordnance material other than small arms ammunition. These differentials are only applicable to work that has been specifically designated by the agency for ordance, explosives, and incendiary material differential pay.

** UNIFORM ALLOWANCE **

If employees are required to wear uniforms in the performance of this contract (either by the terms of the Government contract, by the employer, by the state or local law, etc.), the cost of furnishing such uniforms and maintaining (by laundering or dry cleaning) such uniforms is an expense that may not be borne by an employee where such cost reduces the hourly rate below that required by the wage determination. The Department of Labor will accept payment in accordance with the following standards as compliance:

The contractor or subcontractor is required to furnish all employees with an adequate number of uniforms without cost or to reimburse employees for the actual cost of the uniforms. In addition, where uniform cleaning and maintenance is made the responsibility of the employee, all contractors and subcontractors subject to this wage determination shall (in the absence of a bona fide collective bargaining agreement providing for a different amount, or the furnishing of contrary affirmative proof as to the actual cost), reimburse all employees for such cleaning and maintenance at a rate of $3.35 per week (or $.67 cents per day). However, in those instances where the uniforms furnished are made of "wash and wear" materials, may be routinely washed and dried with other personal garments, and do not require any special treatment such as dry cleaning, daily washing, or commercial laundering in order to meet the cleanliness or appearance standards set by the terms of the Government contract, by the contractor, by law, or by the nature of the work, there is no requirement that employees be reimbursed for uniform maintenance costs.

** NOTES APPLYING TO THIS WAGE DETERMINATION **

Source of Occupational Title and Descriptions:

The duties of employees under job titles listed are those described in the "Service Contract Act Directory of Occupations," Fourth Edition, January 1993, as amended by the Third Supplement, dated March 1997, unless otherwise indicated. This publication may be obtained from the Superintendent of Documents, at 202-783-3238, or by writing to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Copies of specific job descriptions may also be obtained from the appropriate contracting officer.

REQUEST FOR AUTHORIZATION OF ADDITIONAL CLASSIFICATION AND WAGE RATE {Standard Form 1444 (SF 1444)}

Conformance Process:

The contracting officer shall require that any class of service employee which is not listed herein and which is to be employed under the contract (i.e., the work to

be performed is not performed by any classification listed in the wage determination), be classified by the contractor so as to provide a reasonable relationship (i.e., appropriate level of skill comparison) between such unlisted classifications and the classifications listed in the wage determination. Such conformed classes of employees shall be paid the monetary wages and furnished the fringe benefits as are determined. Such conforming process shall be initiated by the contractor prior to the performance of contract work by such unlisted class(es) of employees. The conformed classification, wage rate, and/or fringe benefits shall be retroactive to the commencement date of the contract. {See Section 4.6 (C)(vi)} When multiple wage determinations are included in a contract, a separate SF 1444 should be prepared for each wage determination to which a class(es) is to be conformed.

The process for preparing a conformance request is as follows:

1) When preparing the bid, the contractor identifies the need for a conformed occupation) and computes a proposed rate).

2) After contract award, the contractor prepares a written report listing in order proposed classification title), a Federal grade equivalency (FGE) for each proposed classification), job description), and rationale for proposed wage rate), including information regarding the agreement or disagreement of the authorized representative of the employees involved, or where there is no authorized representative; the employees themselves. This report should be submitted to the contracting officer no later than 30 days after such unlisted class(es) of employees performs any contract work.

3) The contracting officer reviews the proposed action and promptly submits a report of the action, together with the agency's recommendations and pertinent information including the position of the contractor and the employees, to the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, for review. (See section 4.6(b)(2) of Regulations 29 CFR Part 4).

4) Within 30 days of receipt, the Wage and Hour Division approves, modifies, or disapproves the action via transmittal to the agency contracting officer, or notifies the contracting officer that additional time will be required to process the request.

5) The contracting officer transmits the Wage and Hour decision to the contractor.

6) The contractor informs the affected employees.

Information required by the Regulations must be submitted on SF 1444 or bond paper.

When preparing a conformance request, the "Service Contract Act Directory of Occupations" (the Directory) should be used to compare job definitions to insure that duties requested are not performed by a classification already listed in the wage determination. Remember, it is not the job title, but the required tasks that determine whether a class is included in an established wage determination. Conformances may not be used to artificially split, combine, or subdivide classifications listed in the wage determination.AGREEMENT

Between

SVERDRUP TECHNOLOGY, INC.
Technology Group–Hampton

And

INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS, AFL-CIO
Local Union 1340

(Inspectors)

March 1, 2002

INDEX

Appendices

AGREEMENT

Between

Sverdrup Technology, Inc., Technology Group-Hampton

And

International Brotherhood of Electrical Workers, Local Union 1340

PREAMBLE

THIS AGREEMENT entered into this 1st day of March, 2002 by and between Sverdrup Technology, Inc., Technology Group-Hampton, (hereinafter referred to as the "Company"), and Local Union No. 1340, of the International Brotherhood of Electrical Workers, AFL-CIO, (hereinafter referred to as the "Union"), for the purpose of all Construction Inspection work assigned to the Company by the National Aeronautics and Space Administration, (hereinafter referred to as "NASA"), under the Multi-Discipline Architect-Engineer Services Contract and performed by the employees of the Company covered by this Agreement only within NASA, Langley Research Center site and sites and properties related thereto.

WHEREAS, it is the intent of the parties to establish and maintain the highest standard of ethics within the Construction Services Unit. In order to achieve those standards the Company and the Union shall jointly establish reasonable policies and rules regarding actual or potential conflicts of interest within the Unit.

WHEREAS, the Company is engaged in the business of Construction Inspection (as defined in Article V) and this work is of importance to the Union, and it being recognized that unique skills are required to satisfactorily perform this type of work, the Union and the Company wish to enter into an agreement for their mutual benefit covering work of this nature.

WHEREAS, the Company and the Union desire to mutually establish hours of work and working conditions for the employees to the end that satisfactory conditions and harmonious relations will continue to exist for the benefit of both parties to this Agreement.

WHEREAS, the Union, its members and all of those employees represented by the Union, agree to use its and/or their best endeavors to protect the interest of the Company, to consider the Company's property and to give service and/or work of the highest productive quality.

WHEREAS, the Company and the Union have a mutual interest in providing construction inspection services to NASA's Langley Research Center and hence a practical system which enables harmonious and efficient working relationships between the parties is necessary,

NOW THEREFORE the parties agree to the following:

ARTICLE I

TERM OF AGREEMENT

Section 1. This agreement shall take effect March 1, 2002 and shall remain in effect through February 28, 2005.

Section 2. Either party desiring to change or terminate this Agreement must notify the other in writing by registered mail at least sixty (60) days prior to expiration. When Notice for changes only is given, the nature of the changes

desired must be specified in the Notice and until a satisfactory conclusion is reached in the matter of such changes, the original provision shall remain in full force and effect. Neither party hereto may reopen this Agreement for negotiations on any issue, either economic or non economic, during this contract period or by extension thereof, except as provided in Section 3.

Section 3. This Agreement shall be subject to amendments at any time by mutual consent of the parties hereto. Any such amendment agreed upon shall be reduced to writing and signed by the parties hereto. The Union may submit the amendments to the International office of the Union, as it relates solely to compliance with State and Federal regulations.

ARTICLE II

RECOGNITION

Section 1. The bargaining unit under this Agreement shall comprise Construction Inspection employees including X-ray Monitors of the Company as specified in the NLRB Certification of Representation (CASE NO. 5-RC12653).

Section 2. The Company:

(a) Agrees to recognize the Union as herein duly constituted for the purpose of bargaining collectively and administering the Agreement for the employees.

(b) Agrees to bargain collectively with the Union and to be governed by the terms of this Agreement.

ARTICLE III

MANAGEMENT RIGHTS

The Management of the plant and the direction of working forces and of the affairs of the Company, including the right to hire, discipline, suspend or discharge for cause, and the right to reduce forces due to lack of work or curtailment of production shall be vested exclusively in the Management of the Company. Management shall also have the exclusive right to assign or transfer employees, adopt new or changed methods of performing the work, to relieve employees from duty because of lack of work, to make rules and regulations and to change such rules and regulations.

The Company has the right to establish new classifications provided it does not downgrade the pay scale of existing employees. An employee hired to fill a new classification of work shall be limited to performing within such classification, except in unusual or extenuating circumstances.

In the event the Company establishes such new classifications, the parties shall promptly enter negotiations to establish an agreeable wage rate. In the meantime, the Company shall have the right to implement their proposed wage rate with the understanding that a retroactive adjustment may be made subsequent to final agreement of the parties.

It is recognized that the Company shall continue to have the exclusive right to determine partial or permanent discontinuance or shut down of operations.

It is understood and agreed that any of the rights, powers or authority the Company had prior to the signing of this Agreement are retained by the Company except those specifically abridged, granted or modified by this Agreement. The listing of specific Management rights in this Article is not intended to be, nor shall it be considered

a restriction of or waiver of any of the rights of the Company not listed and not specifically surrendered in this Agreement, whether or not such rights have been exercised in the past.

ARTICLE IV

SCOPE OF WORK

This Agreement covers Construction Inspection work assigned to the Company by NASA under the Multi-Discipline Architect-Engineer Services Contract and performed by the employees of the Company covered by this Agreement only within the NASA, Langley Research Center site and sites and properties related thereto.

ARTICLE V

DEFINITIONS

Section 1. Construction Inspection is defined as any work assigned by the Company which is in accordance with the terms of the Company's Multi-Discipline Architect-Engineer Services Contract with NASA and which is in compliance with the Company's obligation to perform any such work under the terms of that contract and conforming with the NLRB certification. A position description for construction inspectors is summarized in Appendix D.

ARTICLE VI

GRIEVANCE PROCEDURE

Section 1. Procedures

All grievances that may arise will be handled in the following manner. No grievance shall be filed, or processed at Step II based on facts, or events, or omission, which have occurred more than six (6) normal work days before grievance is filed. In cases involving dismissal or suspension for just cause, the grievance may be instituted at Step III.

STEP I: Prior to processing any written grievance, any employee who believes he has a grievance, must discuss it with his immediate supervisor, with his steward being present. If the employee is dissatisfied with the answer given by his supervisor, or no answer is given within three (3) normal work days, Step II will be followed

STEP II: The employee and his steward shall present to the Hampton Office Manager a written grievance form provided by the Company (which has been approved by Company and Union) stating what the grievance is and the remedy sought. If the Hampton Office Manager's decision is not agreeable with the union, or is not given within three (3) normal working days, Step III will be followed.

STEP III: The Hampton Office Manager (or his designated representative) within three (3) normal work days after his written decision not agreeable with the union, or failure to give a decision, shall meet at the union's request with the Local Union Business Manager, or his designated representative. If the Hampton Office Manager's decision is not agreeable with the union or is not given within five (5) normal work days, then the Union may request to arbitrate the matter.

STEP IV: The Union may, no later than five (5) normal work days after receipt of the Company's decision in Step III, submit the matter to arbitration by requesting that the Federal Mediation and Conciliation Service submit a list of five (5) names of arbitrators, from which the Company and the Union shall choose an impartial arbitrator to decide the matter. Following receipt of the list of names of arbitrators, the parties shall then alternately strike the names from the panel and the name remaining shall hear the case. The determination of which party is to strike first shall be determined by a coin flip. Striking shall take place within seven (7) normal work days of receipt of the arbitrator list.

Section 2. Arbitration

In the event that grievance procedures lead to arbitration, the expense of the impartial Arbitrator shall be shared equally by both parties. The Company shall attempt to provide facilities at Langley Research Center provided, however, if no facilities are available at the Center, the Union and the Company agree to equally share expenses incurred in the hearing room. Furthermore:

(a) The findings of the Arbitrator shall be binding on both parties.

(b) Except by mutual written agreement to the contrary, only one grievance shall be taken to arbitration at any one time before the same arbitrator.

(c) The impartial Arbitrator shall only have jurisdiction and authority to determine the meaning, application of, or compliance with the provisions of this Agreement and shall not have jurisdiction or authority to add or detract from or alter in any way such provisions or any rules of discipline attached hereto.

Section 3. Time limits

All time limits stated in this Article shall be treated as jurisdictional in nature, and the failure to follow any of the set time limits shall result in the grievance being void and waived, and the matter shall end without resort to arbitration. A normal work day is defined as any day on which any bargaining unit employee is at work, Monday through Friday, except holidays.

ARTICLE VII

UNION REPRESENTATIVES

Section 1. Representatives of the Union shall have access to the job during working hours on union business, provided they do not interfere with the work of employees, and further provided they obtain prior authorization from the Company.

Section 2. The Union has the right to appoint a Steward from the Unit at the Company. The Company shall be notified and furnished the name of the Steward in writing. The Company will deal with the designated Steward until such designated Steward has been revoked in writing by the Union. Such Steward shall be allowed reasonable time (to be scheduled with his supervisor) during the regular working hours without loss of pay to see that the terms and conditions of this Agreement are observed. In no event shall the presence of the Steward disrupt or interfere with the work of the Company because of his faithful performance of duties as Steward. No Steward shall be discriminated against by the Company because of his faithful performance of duties of Steward. The Steward, or alternate, shall be called in by the supervisor before any employee is disciplined.

ARTICLE VIII

REFERRAL OF EMPLOYEES

Section 1. When employees are required, the Company shall request from the Local Union that the required number of applicants be referred for employment. The following minimum standards shall apply.

(a) The selection of applicants for referral to jobs shall be on a nondiscriminatory basis and shall not be based on, or in any way affected by Union membership, by-laws, rules, regulations, constitutional provisions, or any other aspect or obligation of Union membership, policy, or requirement. Local Union 1340, International Brotherhood of Electrical Workers, will refer applicants to the Project covered by this Agreement regardless of race, color, sex,

handicap, national or ethnic origin, or veteran status. It does not discriminate on the basis of race, color, sex, handicap or disability, national or ethnic origin in the referral of applicants.

(b) The Company shall retain the right to select or reject any applicant referred by the Local Union, and shall have the further right to select any applicant from among those referred by the Union, while complying with all applicable Federal laws, regulations, and rulings in our hiring and employment activities. When the Company requests an applicant or referral from the Union, the Union will refer such applicant within forty-eight (48) hours [two (2) normal work days] and in the event the Union fails to refer an applicant within that period of time, the Company is free to utilize other sources to fill its manpower needs.

(c) The Local Union shall post in places where notices to employees and applicants for employment are customarily posted, all provisions relating to the function of its hiring arrangements, including the provisions herein set forth. The Company shall similarly post in places where notices to employees and applicants for employment are customarily posted, all provisions relating to the function and operation of the hiring arrangements including these provisions.

(d) The Union agrees to indemnify and hold the Company harmless against any and all claims, demands, suits, costs and/or any other forms of action and assumes any and all liabilities and expenses that shall arise out of or by reason of the Union's administration of the hiring hall referred to in this Article. It is also expressly understood that those applicants that are referred by the Union will be selected on a nondiscriminatory basis and that the Company shall assume the liabilities that attach for failure to hire an applicant referred by the Union.

(e) The Union agrees to recognize the Company's Affirmative Action Program and will refer qualified job applicants according to established underutilization goals.

Section 2. In addition to the forgoing minimum standards, the Local Union agrees to refer all applicants for employment to this project according to the standards for criteria uniformly applied to any project in the area. An Appeals Committee is hereby established composed of one member appointed by the Union, one member appointed by the Company and a public member appointed by both these members. It shall be the function of the Appeals Committee to consider any complaint of any employee or applicant for employment arising out of the administration by the Local Union of Section 1 of this Agreement. The Appeals Committee shall have the power to make a final and binding decision on any such complaint which shall be complied with by the Local Union. The Appeals Committee is authorized to issue procedural rules for the conduct of its business but it is not authorized to add to, subtract from, or modify any of the provisions of this Agreement and its decisions shall be in accord with this Agreement.

Section 3. The designation and determination of the number of foremen and other supervisory personnel is the responsibility of the Company.

Section 4. The above hiring provisions have been entered into in order to comply with the Mountain Pacific doctrine of the National Labor Relations Board. Upon any Board or court decision or administrative ruling modifying or changing the Mountain Pacific doctrine, either party to this Agreement shall have the right to re-open negotiations pertaining to this Article by giving the other party thirty (30) calendar days written notice.

ARTICLE IX

UNION SECURITY

It is agreed that all employees coming under the terms of this Agreement shall be required to make application to joining the Union within thirty (30) days of employment or Agreement, whichever is later, and as a condition of continued employment, must maintain membership in good standing for the life of this Agreement and any renewal thereof. In the event the Union requests the Company to dismiss an employee to comply with the provisions of this Article, such request shall be complied with by the Company.

ARTICLE X

WAGES

Section 1. Wage rates set forth in Appendix "A", attached hereto, and made a part hereof, are to be paid to those employees listed under Appendix "A" for this term of this Agreement.

Section 2. Wages will be paid bi-weekly by means of direct mailing or deposit to be selected by the employee. The payroll period will close at mid-day on Friday.

Section 3. The Company agrees to make available to all employees United States Savings Bonds and United Way through payroll deductions.

Section 4. Working and Basic Dues Check-Off:

The Company agrees that it will make Union Working Dues Deductions from the pay of all members working under the terms of this Agreement in the amount of one and one-half percent (1.5%) of gross bi-weekly pay plus Basic Bi-Weekly Union Dues of the basis of individually signed payroll deduction authorizations on the form set out below in Section 5. The Company will make these deductions bi-weekly as designated in the individually signed payroll deduction authorizations. The Employer will pay the aggregate of such deductions monthly to the Financial Secretary of the Union, who shall be authorized to issue a receipt in the name of the Union. Along with the check for the amount of the calendar monthly deductions, the Company shall send mutually agreed number of copies of a form furnished by the Union which sets forth the name, social security number, the number of clock hours worked, and his gross earnings for the calendar month, and said copies will be executed to cover the aggregate number of bi-weekly payrolls in each calendar month. The check and/or respective monies shall be transmitted not later than fifteen (15) days after the end of the month for which deductions are being made.

Section 5. Deduction Form. Employees will complete and submit the payroll deduction form included in Appendix C.

ARTICLE XI

DAY WORK CONDITIONS

Section 1. Eight (8) hours per day shall constitute a standard work day normally between the hours of 7:00 a.m. and 3:30 p.m. Forty (40) hours shall constitute a normal week's work. The Company may alter the work day to accomplish peak and valley workloads. In the event an employee works more than eight (8) hours in a work day but less than forty (40) hours in any week, the employee may receive comp time in lieu of overtime not to exceed three (3) hours a day or ten (10) hours a week excluding Saturday and Sunday. Such comp time must be taken by the end of the normal work week, in which it occurred.

Section 2. All time worked in excess of forty (40) hours per week shall be paid for at the rate of time and one half (11/2). Time worked includes all non-productive leave hours excluding health fund benefit coverage and worker's compensation.

Section 3. The Company may change the starting and quitting times of any shift, on a permanent or temporary basis.

Section 4. Employees called back to work after the conclusion of their regular shift hours shall be

compensated for a minimum of three (3) hours at the appropriate overtime rate regardless of whether the employee called is required to work the entire three (3) hours. In addition, any employee called back to work after his regular shift hours shall be promptly excused upon completion of the job which he was called in to perform.

Section 5. If assigned, employees shall perform the overtime work required. Employees actively working the task requiring overtime shall perform the overtime work required. The Company and Union shall establish an overtime policy which will balance the assignment of overtime equitably by classification. This will normally be balanced within plus or minus ten percent on an annual basis. The overtime policy is set forth in Appendix B.

Section 6. Except for temporary and part time employees, employees terminated by reason of lay-off shall be notified in writing at least two (2) weeks prior to such termination date. Employees who are laid off or discharged will be paid all monies by the end of the next pay period, providing all indebtedness and obligations to the Company by the employee are satisfied.

Section 7. In the event an employee is changed from regular to part time or temporary status, and if the employee is change back to regular status within the next 12 months, sick leave balances will be reinstated.

ARTICLE XII

WORK SHIFTS

Section 1. When so elected by the Company, multiple shifts normally consisting of no less than eight (8) hours may be worked. When two (2) or three (3) shifts are worked, the first or day shift, shall normally be established from 7:00 a.m. to 3:30 p.m.; the second shift shall normally be established from 3:00 p.m. to 11:30 p.m.; and third shift shall normally be established from 11:00 p.m. to 7:30 a.m. A thirty (30) minute lunch shall normally be taken approximately midway through the shift plus or minus one hour. Lunches not observed during this time period at the direction of the Company will be counted as hours worked and paid at the appropriate rate. Shift schedules may be changed to accommodate construction contractor activity.

Section 2. The pay for the second shift shall be straight time plus seven and one half (71/2) percent; and the third shift rate of pay shall be straight time plus ten (10) percent.

Section 3. Eligibility for shift differential shall be based upon the majority of non overtime hours worked on a given shift in accordance with the following sub-sections.

Section 3a. Shift differential shall not be applicable to non productive leave hours for employees on temporary shift assignment; except for holidays, when the employee works the day before and the day after the holiday. Temporary assignment is defined as working an assigned shift for less than 30 normal work days.

Section 3b. Temporary shift assignments may be made for any period less than 30 normal work days.

Section 4. Except in the case of part time, temporary, or X-Ray Monitors, when shift changes from or to temporary or regularly assigned shifts are directed, there shall be a minimum of 16 hours between any assigned shifts. If such changes prevent the employee from working a 40 hour week, then the employee shall be paid for non worked hours at the day shift rate, but not in excess of 8 non worked hours for any one change. Part time, temporary or X-Ray Monitors shall be permitted a minimum of 8 hours between shift changes.

ARTICLE XIII

HOLIDAYS, LEAVES, JURY PAY AND PENSION

Section 1. Holidays.*

(a) The following days shall be observed as holidays under this Agreement:

New Year's Day
Martin Luther King Day
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Christmas Day

* The above holidays will be observed on the same day that NASA observes them.

(b) In the event the government proclaims a permanent holiday other than those listed in Section 1 above, then the employees shall be granted that holiday. If an employee is scheduled to work on a holiday, but fails to do so, he will receive no holiday pay.

(c) An employee who works on one of the above-listed holidays shall be paid at time and one-half (11/2) his straight-time rate of pay for all hours worked on that holiday, in addition to any holiday pay for which he may be qualified.

(d) To be eligible for holiday pay, an employee must work his regularly scheduled day before the holiday and his regularly scheduled day after the holiday unless on approved, scheduled vacation, bereavement leave, jury duty, or due to sickness or accident with proper physician documentation.

Section 2. Administrative Leave.

On days which are not recognized as holidays under Section 1 above, but where the Government, because of special events and occasions substantially reduces the normal activity at the Center because of such special events or occasions, and allows reimbursement to the Company, the following provisions shall apply:

(a) Those employees who are required to work will be paid at their straight-time hourly rate; provided, however, that said employees will have a compensatory day off at their straight time base rate of pay for such compensatory time.

Those employees who are not required to work will receive a day's compensation at their regular straight-time hourly rates.

In the event that access to NASA-LaRC is restricted for inclement weather, security or other reasons, such lost time will be classed as administrative leave and will be paid to the affected employees as if it had been worked, providing that such costs are deemed reimbursable by the Government. Such administrative leave will not be charged against the employees' vacation or comp time accounts.

Section 3. Definition.

The interpretation of man-hours worked and hours worked for the purpose of vacation and sick leave accruals is all straight-time hours to include paid non-productive time, i.e., vacation, sick leave, holidays, and other time which is not directly chargeable to work orders but which is allowable to other overhead accounts.

Section 4. Annual Leave.

(a) Employees with less than three (3) years shall earn one (1) hour Annual Leave per year for every twenty (20) man-hours worked.

(b) Employees with three (3) years, but less than fifteen (15) years shall earn (1) hour Annual Leave for every

thirteen (13) man-hours worked.

(c) Employees with more than fifteen (15) years shall earn one (1) hour Annual Leave for every ten (10) man-hours worked.

(d) Employees may only carry over a maximum of 240 hours of Annual Leave at year ending December 31.

(e) Length of service includes the whole span of continuous service with the present (successor) contractor and with the predecessor contractors in the performance of similar work at the same Federal facility.

(f) Employees desiring to take annual leave must receive permission from the Company by 9:00 a.m. the day before annual leave is desired. The Company may grant emergency vacations for extreme emergencies. Such granting of emergency leave shall be at the Company's discretion and not subject to the grievance procedure. Each employee will be allowed two unscheduled annual leave absences to be taken at the employee's discretion. The employee will have two (2) opportunities annually to take this unscheduled annual leave. The total number of hours for both unscheduled absences can not exceed eight (8) hours. Time is charged to employee's annual leave.

(g) Employees who schedule vacations of one (1) week or more and who submit a written request through Payroll three (3) weeks or more in advance of the vacation starting time, will be paid vacation allowance prior to the end of the work shift on the last work day preceding the vacation schedule. All employees requesting advance vacation pay must begin their vacation on Monday.

(h) All vacation hours taken by employees are subject to the approval of management. Employees must submit requests for vacation at least two weeks prior to start of vacations of 40 or more hours.

Section 5. Sick Leave.

(a) Employees will earn (1) hour of sick leave for every (20) hours worked.

(b) Employees absent from work because of illness must, upon reasonable request in accordance with the company's sick leave policy, submit administratively acceptable evidence that they were ill and unable to work.

(c) Employees may accumulate all unused sick leave from one year to the next.

(d) Any employee abusing sick leave benefits will be subject to immediate discharge.

(e) Employees absent from work because of illness must inform the Company of the telephone number and address where they may be reached during such time of illness.

Section 6. Jury Duty or Witness Appearance.

(a) Regular, full-time employees are permitted time off with pay to serve on a jury or to appear as a grand jury witness (if not the accused) upon presentation of their court notice or subpoena to their supervisor. Employees must give their supervisors evidence of time served in court and fees paid, and are paid their straight-time pay less fees received from the court. If no fees are paid by the court, the Company pays the full amount.

(b) Regular, full-time employees serving as a witness other than before the grand jury are allowed time off but will be paid only if serving at the request of the Company or NASA.

Section 7. Bereavement Leave.

(a) In the event of a verifiable death in an employee's immediate family of any of the following relatives: Spouse, child, mother, father, brother, sister, father-in-law or mother-in-law, the employee shall be entitled to be absent from work for a period not to exceed two normal working days to afford him an opportunity to attend the

funeral and/or participate in other matters relating to the death of the deceased. This period of time shall not exceed one (1) normal work day following the funeral. During such absence, the employee shall be compensated at his regular straight-time hourly rate for each eight (8) hour work day absent.

(b) In the event of a verifiable death of an employee's grandparent or an employee's grandchild, the employee shall be granted one day off to attend the funeral, providing the funeral occurs on a normal work day and providing the employee attends the funeral. During such absence, the employee shall be compensated at his regular straight-time hourly rate for the eight (8) hour work day absent.

Section 8. Retirement Fund.

(a) The Company agrees to contribute on behalf of all regular non-probationary employees working under the terms of this Agreement, seven and one-half percent (7-1/2%) of their gross bi-weekly pay, excluding any health and welfare, uniforms or safety equipment allowances, into the Southern Electrical Retirement Fund.

(b) The company agrees to be bound by the terms of the Agreement and Declaration of Trust establishing the Southern Electrical Retirement Fund and all rules and regulations adopted by the Trustees of the Fund from time to time, provided the Fund continues to be maintained as a tax exempt trust under the relevant provisions of the Internal Revenue Code and otherwise conforms to all requirements of the law.

(c) The company and the Local Union agree that the Trustees heretofore appointed to the Southern Electrical Retirement Fund by the National Electrical Contractors Association, Virginia Chapter, and the Local Union, and as they shall from time to time be replaced, shall represent the Company and the Local Union, respectively.

(d) Contributions shall be transmitted by the Company to the plan administrator not later than fifteen (15) days after the end of the month for which contributions are being made. Along with the contributions, the Company shall furnish to the plan administrator, a mutually agreeable form setting forth the employee's name, Social Security number, gross monthly earnings, hours worked, and the amount contributed by the Company for each employee covered by the terms of this Agreement. Contributions for all bi-weekly payroll periods ending during the calendar month shall be included in the report for that month.

ARTICLE XIV

TRAVEL

During the term of this Agreement, subsistence, travel allowance, mileage, per diem, or pay for travel time shall not be paid to any employee covered by the terms of this Agreement unless approved by the Hampton Office Manager.

ARTICLE XV

SUPERVISION

The Company reserves the right to send into the area of work as many supervisors and engineers as it deems necessary to carry out the work covered by this Agreement. Such management personnel shall not be prohibited from performing construction inspections under certain circumstances such as:

(1) during absences of bargaining unit inspector

(2) during emergencies

(3) on large contracts when special problems exist or may be anticipated, and
(4) when variations in task order workload create requirements for personnel of limited duration anticipated to be less than two hours per day and no greater than 10 hours per week, excluding all holidays and overtime hours, per Task Order number. This occurs after all efforts have been exhausted to assign task to a bargaining unit inspector.

It is not the intent of the parties that the Company will utilize supervisors or engineers to inspect construction projects on a full-time basis, nor that new supervisor or management positions be established for the sole purpose of replacing Union personnel.

ARTICLE XVI

SAFETY IN THE WORK PLACE

The employees covered by this Agreement shall, at all times while in the employ of the Company, be bound by the safety rules and safety regulations as established by the Company. All employees will be issued Company safety manuals.

The Company has a vital interest in maintaining safe, healthful and efficient working conditions for its employees. Being under the influence of alcohol or drugs (illegal or prescribed) on the job may pose serious safety and health risks not only to the user but to all industrial equipment, vehicles and other employees. The possession and use, distribution or sale of an illegal substance or alcohol in the work place shall not be tolerated and may result in termination and prosecution.

The Company and the Union recognize that their health and future are dependent upon the physical and psychological health of their employees and members. Accordingly, it is the right, obligation and intent of the Company to maintain and the Union to support, a safe, healthful and efficient working environment for all.

In the event the Company has reasonable suspicion that the employee is engaged in substance abuse it shall have the right to require a urinalysis test for confirmation. The Union recognizes and supports the Company's drug testing policy.

ARTICLE XVII

WORK RULES

The Union agrees that the Company has the sole and exclusive right to establish reasonable rules, policies and regulations not in conflict with the express terms of this Agreement governing employment and working conditions.

The Company agrees to provide copies of such rules, policies, and regulations to the Union ten (10) days in advance of their becoming effective. This period will allow the Union an opportunity to review the rules, policies and regulations prior to implementation. Under special and compelling circumstances, such as a NASA Directive or a safety requirement, implementation may become effective immediately upon notification of the Union.

ARTICLE XVIII

SENIORITY

Section 1. In the event of reduction of the work force, employees with the shortest length of service in their classification, will be laid off first.

Section 2. All new regular employees shall be on a probationary period for a period of ninety (90) calendar

days. Probationary employees shall receive the wages and the fringe benefits, as described in this Agreement. New regular employees shall have no seniority until the probationary period has been completed. After completion of the probationary period, an employee's seniority shall then be credited from the date of hiring. Probationary employees shall receive a performance review on or about thirty (30), sixty (60), and eighty-five (85) days after date of hire. Any decisions by the Company to terminate probationary employees on the basis of response to supervision, attendance, or ability to perform assigned tasks, shall be final and will not be subject to Article VI (Grievance Procedures) of this Agreement. This applies to the termination of a probationary employee only.

Section 3. A seniority roster shall be prepared and posted by the Company every 12 months. Any discrepancies with posting must be submitted in writing within 15 calendar days.

Section 4. Seniority shall be canceled and terminated upon the happening of any of the following events:

(a) An employee quits.

(b) An employee is discharged

(c) An employee fails to return to work within five (5) days of notice of recall given by the Company by registered or certified mail.

(d) Settlement has been made for total disability

(e) An employee has retired

(f) An employee has been in layoff status or is absent because of sickness or injury for more than twelve (12) months.

ARTICLE XIX

PROTECTIVE LEGISLATION

All employees covered by this Agreement shall have the protection of all existing Federal, State, and Local laws applicable to employees in general.

ARTICLE XX

PERIODIC CONFERENCE

Periodic conferences shall be held by the parties from time to time for the purpose of discussing matters of mutual interest.

ARTICLE XXI

GENERAL SAVINGS CLAUSE

Any provisions in this Agreement which are in contravention of any Federal, State, Local, or County regulation or laws affecting all or part of the limits covered by this Agreement shall be suspended in operation within the limits to which such law or regulation is in affect. Such suspension shall not affect the operation of any such provisions covered by this Agreement, to which the law or regulation is not applicable. Nor shall it affect the operations of the remainder of the provisions of the Agreement within the limits to which law or regulation is applicable.

ARTICLE XXII

WORK STOPPAGE

During the life of this Agreement, the Union agrees there shall be no strikes, work stoppages, slowdowns, interruptions, sympathy strikes, or delays of work of any nature, whether in protest of matters of actions covered by the Agreement, or matters or actions not referable thereto and not within the normal bargaining relationship between the parties and whether or not based upon alleged violations of State or Federal law, for any purpose whatsoever. Neither the Union nor any employee shall observe any organizational picket line.

Any employee who encourages or participates in a strike, stoppage, sit down, slowdown, sympathy strike, organizational picketing, or organized curtailment of work, as set out in this provision shall be subject to discharge.

In the event a strike occurs with another bargaining group, employees covered by this collective bargaining agreement shall not be assigned to perform the struck work.

ARTICLE XXIII

LANGLEY FEDERAL CREDIT UNION
PAYROLL DEDUCTIONS AND DIRECT DEPOSITS

The Company agrees to payroll deduction authorization and direct deposition, if duly signed by the employee, for the Langley Federal Credit Union, and said money will be forwarded to the Credit Union, subject to the following:

(1) All authorizations for Langley Federal Credit Union checkoff will be honored by the Company only upon the receipt by the Company of executed forms sent to the Company by the Credit Union.

(2) All cancellations for Credit Union checkoffs will be honored by the Company only upon the receipt by the Company of properly executed forms sent to the Company by the Credit Union.

(3) All cancellations of increases or decreases in such checkoffs, which are received by the Company a minimum of three (3) working days prior to the close of a pay period will be processed by the Company effective with that pay period; provided, however, at least thirty (30) days have lapsed since processing a change notice for the affected employee.

The Union agrees to save the Company harmless from any action or claims growing out of these deductions (checkoff) and commenced by any employee or former employee of the Company. The Company's sole responsibility is to forward the monies deducted to the Credit Union bi-weekly. The checkoff period to close midnight on Friday and payment to be mailed on or before the Friday of the following week.

ARTICLE XXIV

HEALTH AND WELFARE

Section 1. Policy

(a) The Company will fund the IBEW Local Union 1340 Health Fund in the amounts designated in Section 2.

Section 2. Funding and Membership

(a) Entry into the program is restricted to new hires at the time of hiring or existing employees between May 1 and May 30 of each year.

(b) Effective 1 March, 2002, through 28 February, 2003, employees electing to participate in the Health Fund will have a per pay period deduction of $7.05 for employee only coverage, $15.54 for employee and 1 dependent coverage and $19.39 for 2 or more dependents coverage. The Company will contribute the difference in the monthly premium cost and the employee deduction.

(c)Annual increases in premium costs, as requested by the Health Fund Trustees, up to and including eight percent (8%) per year during the period of 1 March 2003 through 28 February 2005 shall be borne by the Company. Annual increases in premium costs greater than eight percent (8%) up to and including fifteen percent (15%) shall be shared on the basis of fifty percent (50%) by the Company and fifty percent (50%) by the Employee. Annual increases in premium costs greater than fifteen percent (15%) shall be borne by the Employee.

(d) Provided there is no annual increase in premium costs requested by the Health Fund Trustees on 1 March, 2003, the unused increase will be added to 1 March, 2004. On 1 March, 2004, if a premium increase is requested by the Health Fund Trustees, the first fifteen percent (15%) in increased premium costs shall be borne by the Company. Increases in premium costs greater than fifteen percent (15%) up to and including twenty percent (20%) will be shared on the basis of fifty percent (50%) by the Company and fifty percent (50%) by the Employee. Annual increases in premium costs greater than twenty percent (20%) shall be borne by the Employee.

(e) All employees within the unit shall have the option of enrolling in the IBEW Local Union 1340 Health Fund, or at the individual employee's option may elect to receive seventy-five (.75) cents per hour in lieu of accepting the Health Fund.

(f) Employee contribution deductions will be made in accordance with Section 125 of the Internal Revenue Code.

Section 3. Group Life, Accidental Death/Dismemberment and Disability Insurance

The Company will continue to fund the IBEW Local Union 1340 Group Life, Accidental Death and Dismemberment, and Accident/Sickness Disability Insurance for all employees. Any increase in premium costs shall borne by the employee.

ARTICLE XXV

SAFETY EQUIPMENT

In the interest of employees' safety, the Company agrees to the following terms of supplemental monetary support to partially defray the personal cost of the indicated safety equipment.

Section 1. For the duration of the new agreement, and upon presentation of proper receipts for cost of safety shoes worn on the job, the Company will reimburse the individual employee up to one hundred twenty dollars ($120) or the actual cost, whichever is less, per year for the purchase of new safety shoes.

Section 2. Upon submittal of proper receipts and explanation of benefits form(s) from health care provider(s) for

the cost of lenses and/or frames for safety glasses, the Company will reimburse the individual employee up to one hundred ten dollars ($110) per year for safety glasses worn on the job. In no case shall the maximum amount of reimbursement when combined with other benefits received, whatever the source, exceed the cost of the safety glasses. This provision is intended to be supplemental to any and all other benefits which may be available to the individual employee.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement consisting of 27 pages, which has been agreed to on the fifteenth day of February, 2002, and signed on the twenty-sixth day of February, 2002.

FOR THE COMPANY:

SVERDRUP TECHNOLOGY, INC.
Technology Group- Hampton Office
Local Union 1340

Paul E. Sensmeier, Manager

FOR THE UNION:

INTERNATIONAL BROTHERHOOD OF
ELECTRICAL WORKERS, AFL-CIO

James W. Avery, Business Manager.

APPENDIX A

WAGE SCHEDULE

Section 1. The Company agrees to pay the following hourly rates for the classifications listed below:

MINIMUM WAGE RATE PER HOUR

	Effective 1 March 2002	Effective 1 March 2003	Effective 1 March 2004
Construction Inspector	20.95	21.80	22.55
X-Ray Monitor	10.72	11.15	11.53

In accordance with APPENDIX D, Section 6, Construction Inspector rates shall be paid to those Inspectors who are certified by NASA to "hang" red safety tags. If an Inspector's certification lapses for any reason, the wage rate shall be reduced by 75 cents per hour until the Inspector becomes recertified. Furthermore, any new Inspector's wage rate shall be reduced by 75 cents per hour until that Inspector becomes certified. At the beginning of the first payroll period following recertification or initial certification, respectively, the 75 cents per hour will be restored to the Inspector's wage rate to bring it to the proper minimum shown in the table.

Section 2. Temporary hires (working in accordance with Article XI for a period not to exceed 120 days) shall receive the established rate plus an amount of 20% of the established rate in lieu of benefits.

Section 3. Part time hires shall receive the established rate plus an amount of 20% of the established rate in lieu of benefits.

APPENDIX B

JOB ASSIGNMENTS AND OVERTIME

1. The Supervisor, Construction Services and supervisory inspectors will review and assign the lead inspector and support inspectors according to work load and trade requirements.

2. Overtime or compensatory time counts in overtime accrual totals.

3. When two inspectors have the same amount of overtime-roster hours, alphabetical order will be used to determine the overtime assignment.

4. During normal work hours, an inspector has to be present to accept or reject overtime.

5. The inspector will be allowed a maximum of thirty minutes to either accept or reject overtime.

6. Weekend overtime will be canvassed by Thursday afternoon prior to close of business when notice by the Company permits. On short notice by the Company, canvassing will be conducted as soon as notification is received.

7. Weekday overtime will be canvassed as soon as notification is received.

8. All overtime shall be extended to the low overtime-roster inspector within the classification required.

9. Assigned inspector may cover emergency or unscheduled overtime. If that inspector cannot cover this overtime, he will be charged and the low overtime-roster inspector will be given the option to work.

10. The assigned inspector shall be responsible for arranging overtime and briefing inspector from low list. Low list inspector that will cover overtime shall notify security and maintain proper logs for that work.

11. Lowest overtime-roster inspector can work if overtime is multi-craft and no uninspected work is being covered up. If some work is being concealed which has not been inspected, then lowest qualified inspector shall be assigned to check work before concealment.

12. In the event no one accepts the work after all qualified inspectors are canvassed, the assigned inspector within the classification will be required to work.

13. New employees shall start with highest hours plus one hour of that classification.

14. The Company and the Union agree to the above procedure in order to level overtime opportunity within ± 10% on an annual basis within a classification.

APPENDIX C

UNION DUES DEDUCTION FORM

TO: SVERDRUP TECHNOLOGY, INC., TechnologyGroup (EMPLOYER)

I hereby authorize and direct you to deduct Union working dues bi-weekly from my pay, plus monthly basic Union dues, both amounts of which are to be determined by the Local Union by-laws and the IBEW Constitution and to forward same monthly to the Financial Secretary of the Union in accordance with the Agreement between the Union and the Company. This deduction shall be made from all wages earned by me while working in the jurisdiction of Local Union 1340, IBEW.

This authorization and direction shall be irrevocable for a period of one (1) year from the date hereof or until the anniversary date of the present Agreement, whichever is sooner, at which time I may revoke it by giving the Employer written notice any time with thirty (30) days prior to the expiration of the year period, or thirty (30) days prior to the anniversary date of the present Agreement, whichever occurs sooner. If no such notice is given, this authorization shall be irrevocable for successive one (1) year periods thereafter, or for successive contract periods, whichever are shorter, with the same period of revocation at the end of each such period and shall continue thereafter in full force and effect until revoked by written notice to you.

Date:_____ Signed:_____

Social Security Number: _____

APPENDIX D

SUMMARY POSITION DESCRIPTION FOR CONSTRUCTION INSPECTORS

Section 1. General

Construction Inspectors examine any of a variety of construction goods, services or operations, within designated trades, for conformance to contract requirements as documented by plans, specifications, reference specifications, approved submittals, codes and industry practice. Conducts Quality Control (QC) activity on assigned contracts and performs Quality Assurance (QA) of construction contractors' inspection and testing activities. Monitors tests to verify procedure and results. Conducts tests to demonstrate compliance. Examines raw materials for quality, and manufactured items for defects and for conformance to specifications, visually and using sample models and instruments, such as scales, gauges, templates, calipers and micrometers. Verifies that established standards are maintained relative to such matters as transportation and storage, health and safety, security, sanitation, business practices, operations and services. When required, affixes seals or tags to approved items. Ascertains that licenses and permits have been obtained and displayed. Confers with officials, interprets regulations and codes, and assists in altering methods and practices to meet established standards. Investigates complaints and violations, prepares reports of findings and action taken or recommended and testifies in court. Recommends changes in standards, administrative procedures, facilities, methods, and practices. Performs other tasks as outlined in the current revision of the NASA Langley Inspection Manual.

Section 2. Physical Requirements, Description of Environment, and Other Essential Functions

Requires mobility through construction sites including climbing, crawling, access to confined spaces and heights to 70 ft maximum. Depth perception is required, with or without correction. Ability to hear normal conversation and remote alarms not visually apparent. Capable of carrying documents and test instruments

(maximum wt. 30 lbs), move materials to gain access and passage (maximum wt. 100 lbs) and ability to use tools and test instruments. Ability to operate motor vehicles and work at heights up to 70 ft.

Work is performed indoors and outdoors in all weather conditions. Exposed to noise, dust, hazardous materials, chemicals, high noise, electricity, and high pressure systems on construction sites. Requires good oral and written communication skills with the ability to communicate effectively with tradesmen and other contractor personnel, technicians and engineers. Must be able to obtain, as a minimum, an ADP clearance, and obtain other security clearances when required.

Ability to use the following tools: desk top or lap top computer, hand held radio, telephone, pager, copiers and miscellaneous test equipment pertaining to respective trades, such as: continuity testers, micrometers, volt meters, amp meters, flow hood, pitot tube, windsor probe/schmidt hammer, Hi-pot and Megger meters, holiday testers, concrete slump and test cylinders apparatus, builder's level, and miscellaneous tools.

Work assignments normally between 0700 and 1530 weekdays. Overtime and second and/or third shift as required. Regular, daily, punctual attendance is required to maintain inspection schedules with contractors and to communicate with the client.

Section 3. Task Order Accounting and Client Management

Task Order Accountability: Plan and execute the inspection of assigned task orders to avoid exceeding authorized expenditure limits. Plan site visits and other task activity to accommodate the inherent risks identified in the work, the authorized levels of funding and client requests.

Task Estimating and Reporting: When queried, provide estimates of required inspection hours for initial task order estimates or for estimates to complete task orders in progress. Provide current status and report on significant events relevant to inspection task orders and to the associated construction contract.

Administrative tasks: Maintain individual time card in accordance with current company procedures. Advise supervisor when conditions indicate that authorized funding is not sufficient to permit the levels of inspection assigned by the risk assessment plan, or if no plan is developed, when funding is not sufficient to permit levels of inspection judged appropriate by the inspector.

Client Communication: Maintain communication with the NASA TPE, COTR, Construction Manager (CM) or other client authority as directed in the task order and NASA directives or Company procedures. Query the TPE or COTR at approximately the 30%, 60% and closeout phases of construction to ascertain that services provided are meeting the client's expectations.

Task Team Communication: Maintain communication with other construction inspectors and with other company personnel including the inspection supervisor, lead inspector, construction manager and designers as needed to render efficient and timely services. Provide information regarding contractor on-site personnel and subcontractors as required to maintain database information at the Construction Services Unit.

Task Order Closeout Activity: Submit final deliverables and coordinate task order closeout in accordance with current Company procedures.

Section 4. Inspection Methods and Deliverables

Construction Inspection Record (Log books): Maintain records of inspection activity by documenting recordable events in the format specified by current Company procedures. Prepare inspection records integral with the conduct of inspection services, whenever possible, prior to leaving the job site on each visit. Submit inspection records at frequencies and in the format specified by current Company procedures.

Inspection As-Built Drawings: Maintain inspection as-built drawings up to date within 15 days of site

activity. Submit completed as-built drawings with contract close out documentation.

Work/Punch Lists: Prepare and submit work lists and/or punch lists when appropriate. Prepare lists in accordance with Company procedures.

Inspection of Work in Place: Carry pertinent plans in hand when entering a job site for the purpose of inspecting and accepting work in place.

Other QA/QC Documentation: Develop other QA/QC documents or review documentation prepared by others, including, but not limited to, Radiographic, Visual and other NDE documentation, Hydrostatic and Pneumatic pressure test reports, Certificates of Compliance, Photographic records, inspection checklists, Point to Point wiring diagrams, construction contractor's as-built drawings, weld maps, non-compliance notices and continuity and resistance reports for electrical conductors.

Section 5. Other Duties

Risk Assessment Planning: Review Risk Based Inspection Plans for completeness, and for appropriateness of inspection levels assigned to identified risks.

Travel: Perform inspection activities at sites other than NASA LaRC as directed in specific task orders.

Warranty: Support the client's efforts to obtain warranty services commensurate with the availability of funding and as directed by supervisor.

Safety/Security Compliance Issues: Verify the construction contractor's compliance with the safety and security provisions of the contract in accordance with current Company procedures.

Specification Reviews: Review plans and specifications, subject to time and funding limitations, prior to the release of bid documents as requested by the client. Reviews documents for constructability issues and for best trade practices and documents the review in accordance with current Company procedures.

Assistance of Contract Administration: Communicate site conditions and current status to supervisor and client personnel. Make recommendations as requested. Communicate notices and other contract actions to the construction contractor as directed by supervisor, COTR, TPE, CO, Contract Administrator (CA), CM, or other appropriate authority. Discuss scope definition of contract modifications, including Emergency Field Directed Changes, as requested by the above listed personnel, to define reasonable limits on materials, man hours, equipment requirements and work methods. Review construction contractors' certified payrolls and recommend approval/ disapproval action to the client. Review construction contractors' invoices and attest to the reasonableness of the amount invoiced. Facilitate transfer of GFE/M and salvaged materials.

Coordination of NASA/Construction Contractor Activities: Facilitate construction contractor activities through communication and coordination with appropriate Facility Safety Heads and/or Facility Coordinators, and with effected LaRC activities in accordance with current client or Company procedures. Prepare and submit requests for utility outages, overtime, and other applications required by the client. Coordinate dig permits and safety briefings. Perform other coordination activities as required by current procedures.

Meetings/Facilitation: Attend meetings as directed by the client or by Company procedures, including, but not limited to: Preconstruction conferences, site visits, job site conferences and final inspections. Discuss field solutions to design or construction problems or interferences and the work plans to carry out approved solutions. Document activity on Construction Inspection Records.

Other Duties: Perform other duties as required by the current revision of NASA's Langley Inspection Manual or by Company procedures developed to support the scope of work identified in the manual.

Section 6. Red Tags

The duties of installing and removing red "DO NOT OPERATE" safety tags are included in the scope of the Construction Inspection function. Accordingly, the duties of Inspectors include providing this service. Each Inspector shall maintain familiarity with the NASA LaRC safety clearance procedures listed in LaRC Handbook LAPG 1710.10. NASA will provide training and certification for all Inspectors to install and remove red "DO NOT OPERATE" safety tags. It is required of each Inspector, whether as a primary discipline responsibility or in support of Inspectors of other disciplines, to "hang" red tags.

EXHIBIT D - CONTRACT SECURITY CLASSIFICATION SPECIFICATION DD 254

DEPARTMENT OF DEFENSE
CONTRACT SECURITY CLASSIFICATION SPECIFICATION

(The requirements of the DoD Industrial Security Manual apply to all aspects of this effort)

1. CLEARANCE AND SAFEGUARDING
a. FACILITY CLEARANCE REQUIRED
SECRET
b. LEVEL OF SAFEGUARDING REQUIRED
NONE

2. THIS SPECIFICATION IS FOR: *(X and complete as applicable)*

a. PRIME CONTRACT NUMBER
NNL04AA05B

b. SUBCONTRACT NUMBER

c. SOLICITATION OR OTHER NUMBER — Due Date *(YYMMDD)*
X NNL04-LBE-45419

3. THIS SPECIFICATION IS: *(X and complete as applicable)*

a. ORIGINAL *(Complete date in all cases)* — Date *(YYMMDD)*

b. REVISED *(Supersedes all previous specs)* — Revision No. — Date *(YYMMDD)*

c. FINAL *(Complete Item 5 in all cases)* — Date *(YYMMDD)*

4. IS THIS A FOLLOW-ON CONTRACT? YES — X — NO. If Yes complete the following

Classified material received or generated under _____ *(Preceding Contract Number)* is transferred to this follow-on contract

5. IS THIS A FINAL DD FORM 254? YES — X — NO. If Yes complete the following

In response to the contractor's request dated _____ , retention of the identified classified material is authorized for the period of _____ .

6. CONTRACTOR *(Include Commercial and Government Entity (CAGE) Code)*
a. NAME, ADDRESS, AND ZIP CODE

MAINTHIA TECHNOLOGIES, INC.
7055 ENGLE ROAD, SUITE 502
CLEVELAND, OH 44130-8361

b. CAGE CODE
c. COGNIZANT SECURITY OFFICE *(Name, Address, and Zip Code)*
1PNM8

7. SUBCONTRACTOR
a. NAME, ADDRESS, AND ZIP CODE
b. CAGE CODE

c. COGNIZANT SECURITY OFFICES *(Name, Address, and Zip Code)*

8. ACTUAL PERFORMANCE
a. LOCATION
b. CAGE CODE

NASA LANGLEY
RESEARCH CENTER
HAMPTON, VA
23561-2199

N/A

c. COGNIZANT SECURITY OFFICE *(Name, Address, and Zip Code)*

N/A

9. GENERAL IDENTIFICATION OF THIS PROCUREMENT

INSPECTION AND QUALITY ASSURANCE

10. THIS CONTRACT WILL REQUIRE ACCESS TO:	YES	NO
a. COMMUNICATIONS SECURITY (COMSEC) INFORMATION		X
b. RESTRICTED DATA	X	
c. CRITICAL NUCLEAR WEAPON DESIGN INFORMATION		X
d. FORMERLY RESTRICTED DATA:		X
e. INTELLIGENCE INFORMATION:		

11. IN PERFORMING THIS CONTRACT, THE CONTRACTOR WILL:	YES	NO
a. HAVE ACCESS TO CLASSIFIED INFORMATION ONLY AT ANOTHER CONTRACTOR'S FACILITY OR A GOVERNMENT ACTIVITY		X
b. RECEIVE CLASSIFIED DOCUMENTS ONLY	X	
c. RECEIVE AND GENERATE CLASSIFIED MATERIAL		X
d. FABRICATE, MODIFY, OR STORE CLASSIFIED HARDWARE		X
e. PERFORM SERVICES ONLY		X

(1) Sensitive Compartmented Information (SCI)	X	f. HAVE ACCESS TO U.S. CLASSIFIED INFORMATION OUTSIDE THE U.S., PUERTO RICO, U.S. POSSESSIONS AND TRUST TERRITORIES	X
(2) Non-SCI	X	g. BE AUTHORIZED TO USE THE SERVICES OF DEFENSE TECHNICAL INFORMATION CENTER (DTIC) OR OTHER SECONDARY DISTRIBUTION CENTER	X
f. SPECIAL ACCESS INFORMATION	X	h. REQUIRE A COMSEC ACCOUNT	X
g. NATO INFORMATION	X	i. HAVE A TEMPEST REQUIREMENT	X
h. FOREIGN GOVERNMENT INFORMATION	X	j. HAVE OPERATIONS SECURITY (OPSEC) REQUIREMENTS	X
i. LIMITED DISSEMINATION INFORMATION	X	k. BE AUTHORIZED TO USE THE DEFENSE COURIER SERVICE	X
j. FOR OFFICIAL USE ONLY INFORMATION	X	l. OTHER *(Specify)* .	X
k. OTHER *Specify)*			

DD Form 254, DEC 1999 *Previous editions are obsolete*

12. PUBLIC RELEASE. Any information *(classified or unclassified)* pertaining to this contract shall not be released for public dissemination except as provided by the industrial Security Manual or unless it has been approved for public release by appropriate U.S. Government authority. Proposed public release shall be submitted for approval prior to release

Direct X Through *(Specify):*

NASA LANGLEY RESEARCH CENTER, M/S 126, HAMPTON, VA 23681-2199
ATTN: Mozetta Edwards, (757) 864-2437

To the Office of Public Affairs, National Aeronautics and Space Administration, Washington, DC 20546, for review.
*In the case of non-DoD User Agencies, requests for disclosure shall be submitted to that agency.

13. SECURITY GUIDANCE. The security classification guidance needed for this effort is identified below. If any difficulty is encountered in applying this guidance or if any other contributing factor indicates a need for changes in this guidance, the contractor is authorized and encouraged to provide recommended changes: to challenge the guidance or classification assigned to any information or material furnished or generated under this contract; and to submit any questions for interpretation of this guidance to the official identified below. Pending final decision, the information involved shall be handled and protected at the highest level of classification assigned or recommended. *(Fill in as appropriate for the classified effort. Attach, or forward under separate correspondence, any document/ guides/extracts referenced herein. Add additional pages as needed to provide complete guidance.)*

ALL PERFORMANCE OF WORK FOR THIS PROCUREMENT INVOLVING CLASSIFIED INFORMATION SHALL BE PERFORMED AT GOVERNMENT OR PROPERLY CLEARED CONTRACTOR FACILITIES.

THE CONTRACTOR HAS NO PERFORMANCE REQUIREMENTS INVOLVING THE GENERATION OR SAFEGUARDING OF CLASSIFIED NATIONAL SECURITY INFORMATION. THE CONTRACTOR PERFORMANCE WILL INVOLVE PERIODIC ACCESS TO CLASSIFIED INFORMATION TO THE SECRET LEVEL.

THE CONTRACTOR FACILITY SECURITY OFFICER (FSO) SHALL CERTIFY THE SECURITY CLEARANCE STATUS OF EMPLOYEES SUPPORTING THIS CONTRACT VIA STANDARD VISIT REQUEST SUBMITTED ANNUALLY OR AS REQUIRED TO THE CERTIFIER IDENTIFIED IN SECTION 16A. THE VISIT REQUEST SHALL INCLUDE THE LEVEL OF CLEARANCE, DATE OF ISSUE, INVESTIGATION TYPE AND DATE COMPLETED.

CONTRACTORS PERFORMING SERVICES ON CONTRACTS INVOLVING ACCESS TO CLASSIFIED INFORMATION ARE SUBJECT TO SECURITY INSPECTIONS BY NASA SECURITY REPRESENTATIVES IN ADDITION TO ANY OVERSIGHT VISITS PERFORMED BY THE DEFENSE SECURITY SERVICE.

THE CERTIFIER IN SECTION 16A SHALL BE PROVIDED A COPY OF ANY DD FORMS 254 ISSUED TO SUBCONTRACTORS PERFORMING WORK FOR THIS CONTRACT.

14. ADDITIONAL SECURITY REQUIREMENTS. Requirements, in addition to ISM requirements, are established for this contract. *(If Yes, identify the pertinent contractual clauses in the contract document itself, or provide an appropriate statement which identifies the additional requirements. Provide a copy of the requirements to the cognizant security office. Use Item 13 if additional space is needed.)*

Yes X No

15. INSPECTIONS. Elements of this contract are outside the inspection responsibility of the cognizant security office. *(If Yes, explain and identify specific areas or elements carved out and the activity responsible for inspections. Use Item 13 if additional space is needed.*

Yes X No

16. CERTIFICATION AND SIGNATURE. Security requirements stated herein are complete and adequate for safeguarding the classified information to be released or generated under this classified effort. All questions shall be referred to the official named below.

Exhibits E & F

have been redacted.

a. TYPED NAME OF CERTIFYING OFFICIAL

MICHAEL E. REAGAN
b. TITLE

SECURITY SPECIALIST
c. TELEPHONE *(Include Area Code)*

(757) 864-9470
d. ADDRESS *(Include ZIP Code)*
17. REQUIRED DISTRIBUTION
NASA LANGLEY RESEARCH CENTER
M/S 450, ATTN: MICHAEL REAGAN
HAMPTON, VA 23681-2199
e. SIGNATURE

X	a. CONTRACTOR
	b. SUBCONTRACTOR
	c. COGNIZANT SECURITY OFFICE FOR PRIME AND SUBCONTRACTOR
	d. U.S. ACTIVITY RESPONSIBLE FOR OVERSEAS SECURITY ADMINISTRATION
	e. ADMINISTRATIVE CONTRACTING OFFICER
	f. OTHERS AS NECESSARY

DD Form 254 Reverse, DEC 1999**EXHIBIT E - SAFETY AND HEALTH PLAN**

To be submitted
EXHIBIT F - IT SECURITY PLAN

To be submitted
EXHIBIT G - Applicable Regulations, Statutes, and Procedures

EXHIBIT H - Worker Qualifications

The Contractor shall employ qualified and experienced personnel in all disciplines of work. Quality Assurance Evaluators and Construction Inspectors shall possess a minimum of two years formal education and five years experience at the journeyman's level within their field of expertise (ten years of concurrent work experience will be considered equivalent to the above-cited formal education and experience requirement). Additional certifications that are required depending on the identified position and assigned duties are as follows:

a) Master Electrician Tradesman license issued by the State of Virginia
b) Radiation Worker Certification
c) Asbestos Worker/Monitor Certification
d) Master Mechanical Tradesman licenses issued by the state of Virginia (Gas fitter/ HVAC/ Plumber)
e) Certification of Completion of Refrigerant Transition and Recovery Certification Program as required by 40CFR Part 82, subpart F
f) Licensed Surveyor
g) National Association of Elevator Safety Authority (NAESA) Qualified Elevator Inspector (QEI) Certification

EXHIBIT I – LANGLEY FORM 322

EXHIBIT G - APPLICABLE REGULATIONS, STATUTES, AND PROCEDURES

Document No.	Document Title	Version	Publicly Accessible	Document Location
LAPD 1710.5	Ionizing Radiation	Sept. 27, 2001	Yes	http://ldms.larc.nasa.gov
LAPG 1710.8	Nonionizing Radiation	Jul. 31, 2001	Yes	http://ldms.larc.nasa.gov
LAPG 1710.10	Safety Clearance Procedures	Aug. 2, 2002	Yes	http://ldms.larc.nasa.gov
LAPG 1710.12	Potentially Hazardous Materials	May 3, 2001	Yes	http://ldms.larc.nasa.gov
LAPG 1710.40	Safety Regulations Covering Pressurized	Mar. 15, 2000	Yes	http://ldms.larc.nasa.gov
LAPG 1740.2	Facility Safety Requirements	Jul. 1999	Yes	http://ldms.larc.nasa.gov
LAPG 1740.3	Facility Safety Head and Facility	Aug. 21, 2003	Yes	http://ldms.larc.nasa.gov
LAPG 1740.6	Personnel Safety Certification	May 3, 2001	Yes	http://ldms.larc.nasa.gov
LAPG 1740.7	Process Systems Certification Program	Dec. 21, 2000	Yes	http://ldms.larc.nasa.gov
LAPG 2570.5	FCC Radio Frequency Spectrum Management	Aug. 1999	Yes	http://ldms.larc.nasa.gov
LMS-CP-4754	Quality Assurnance (QA) for Software Development and Acquisition	Revision B-1	No	http://lms.larc.nasa.gov
LMS-CP-4850	Non-U.S. Citizen(s)/Foreign Representative(s) Visitor Approval	Revision G	No	http://lms.larc.nasa.gov
LMS-OP-5689	Facility Systems Engineering Project Management Plan Development	Revision B-1	No	http://lms.larc.nasa.gov
NPG 1371.2	Procedures and Guidelines for Processing Requests for Access to NASA Installations or Facilities by	Apr. 7, 2003	Yes	http://nodis3.gsfc.nasa.gov
NPG 2810.1	Security of Information Technology - Software	Aug. 26, 1999	Yes	http://nodis3.gsfc.nasa.gov
NPG 4200.1E	Equipment Management Manual	Jul. 7, 1999	Yes	http://nodis3.gsfc.nasa.gov

EXHIBIT H - WORKER QUALIFICATIONS

The Contractor shall employ qualified and experienced personnel in all disciplines of work. Quality Assurance Evaluators and Construction Inspectors shall possess a minimum of two years formal education and five years experience at the journeyman's level within their field of expertise (ten years of concurrent work experience will be considered equivalent to the above-cited formal education and experience requirement). Additional certifications that are required depending on the identified position and assigned duties are as follows:

a) Master Electrician Tradesman license issued by the State of Virginia
b) Radiation Worker Certification
c) Asbestos Worker/Monitor Certification
d) Master Mechanical Tradesman licenses issued by the state of Virginia (Gas fitter/ HVAC/ Plumber)
e) Certification of Completion of Refrigerant Transition and Recovery Certification Program as required by 40CFR Part 82, subpart F
f) Licensed Surveyor
g) National Association of Elevator Safety Authority (NAESA) Qualified Elevator Inspector (QEI) Certification

EXHIBIT I – LANGLEY FORM 322

Facility Systems Engineering

Construction Phase Support Task Order
CLIN 03 - Cost Plus Incentive Fee
Contract No. NAS1-98128 Initiation Date: 02/02/04

Facility No. and Name:	Task No.:	Project ID No.:

Title:

Description:

Continue on separate sheet if necessary.

Deliverables:

Requester Organizational Code	Accounting Code	Change in Scope			
Schedule & Resources	Original	Rev. 1	Rev. 2	Rev. 3	Rev 4
Purchase Request No.					
Required Completion Date					
Target Cost					
Maximum Fee					
Total Task Order Funding					

APPROVALS			Change in Scope Concurrences			
			Rev. 1	Rev. 2	Rev. 3	Rev 4
Task Monitor	Ext.	Date				
Task Area Manager	Ext.	Date				
Authorized For Contract Performance	COTR	Date				
Accepted By	Cont. Mgr.	Date				

TASK ORDER CLOSEOUT

Target Cost		Task Order Closeout Date		Services Completion Date	
Expended Cost		SVT Project Mgr.		Date	
Estimated Fee		SVT Contract Mgr.		Date	
Total T.O. Dollars		COTR		Date	

EXHIBIT J

NASA
Langley Research Center (LaRC)

Construction Inspection Manual

Facility Systems Technology Area

Engineering Support and Facility Projects Branch

24 January, 2000

NASA LANGLEY RESEARCH CENTER (LaRC)
CONSTRUCTION INSPECTION SERVICES MANUAL

TABLE OF CONTENTS

INTRODUCTION

The NASA Langley Research Center (LaRC) Construction Inspection Manual is a handbook compiled by the Engineering Support and Facility Projects Branch of the Facilities Systems Technology Area, Langley Research Center (LaRC), Hampton, Va. Its purpose is to assist construction inspectors, technicians, engineers and construction managers in the inspection of construction projects at the Langley Research Center (LaRC).

This manual is directed primarily to Construction Inspectors. However, Task Monitor (TM) Contracting Officer's Technical Representatives (COTR) and personnel in acquisition, operations support and safety as well as other branches and divisions will find it a useful guide for their involvement in Langley construction projects. Those not familiar with NASA's policies regarding construction projects should also refer to the NASA Langley Research Center (LaRC) Construction Management Manual and the NASA Facility Project Implementation Handbook.

In summary, NASA Langley Research Center (LaRC) has unique requirements for construction inspection services, techniques and deliverables. This manual attempts to list those services, explain their functions and describe the deliverables for each element. Inspectors should become familiar with the contents of this manual to ensure that all NASA LaRC requirements and construction contract requirements are met. Questions and suggestions pertaining to interpretation, revisions and improvements are desired and invited; submit them to NASA Langley Research Center (LaRC), Facility Systems Technology Area, Inspection Task Area Manger (TAM) (Mail Stop 447).

Duties and Responsibilities

The duties and responsibilities of construction inspectors at NASA Langley Research Center (LaRC) are many and varied, encompassing more than the surveillance of field construction efforts. The construction inspectors play a vital role in the execution of construction projects. As the on-site representative of the contract team, they are involved in all aspects of the construction process, and are instrumental in ensuring that the Government gets the best quality construction for the available dollar.

The construction inspector's primary responsibility is to verify that the work in place complies with the contract plans and specifications and attest that proposed methods will result in complying work. The construction inspector must also confirm that the work is done in a safe manner, that payment requests are accurate, and that all specified testing is performed. In addition to their primary responsibilities inspectors verify all work performed on Langley Research Center (LaRC) comply with the safety standards established by the National Building Codes. They also facilitate the contractor's adherence to schedule by: reviewing plans and specifications for constructability, schedule/coordinate permits, briefings, and other unique Langley Research Center (LaRC)

requirements, and assist in coordinating outages and construction. They inspect, verify and witness, prepare logbooks, site coordination/facilitation, refer to submittals, issue deficiency notices (non-compliance) verify certified payrolls and progress payments, obtain permits, issue red tags, and perform other functions identified in the task order.

Construction inspectors are support service contractors funded through an Incentive Fee contract arrangement with NASA LaRC. Services are requested and paid for by a direct cost accounting, task order approach. Construction inspection services are requested, estimated, managed, funded and evaluated on an individual task order basis. Construction inspectors, hereafter referred to as inspectors, are members of the Construction Services Unit (CSU) which also includes supervisory and secretarial personnel.

Construction inspection services provided are for the sole benefit of the Government. The presence or absence of an inspector does not:

a. Relieve the construction contractor of responsibility for providing adequate quality control measures
b. Relieve the construction contractor of responsibility for damage to or loss of material before acceptance
c. Constitute or imply acceptance
d. Affect the continuing rights of the Government after acceptance of the completed work
e. Relieve the construction contractor of the responsibility for job site safety and protection of government facilities/equipment during construction

Standards of Conduct

The inspector's attitude in dealing with the construction contractors must be cooperative, firm and unbiased. The inspectors must be cordial and impartial and a businesslike relationship must be maintained at all times. Inspectors must never allow themselves to become involved in arguments or to lose their temper with contractor personnel. If a situation starts to deteriorate, the inspector should leave as quickly as possible and request the contracting officer's assistance. Inspectors should not fall into the trap of running the job for the contractor and must be extremely careful in offering him solutions to his problems. If the suggested solution doesn't work, the contractor may claim that he was directed to follow the suggestion and that the Government is liable to pay for the rework. Inspectors should carefully choose their words when the contractor starts probing him for acceptable solutions.

When practical, inspectors should avoid direct dealings with subcontractors. NASA has no contractual relationship with subcontractors as the contract is with the prime. When inspectors must deal with subcontractors, they should ensure that it is in the presence of and with concurrence from the prime contractor's representative.

SCOPE OF WORK

The primary responsibility of inspectors is to ensure that work is in conformance with contract requirements. Inspectors are the eyes and ears on the project, and, must be alert to monitor, report and record all significant happenings on the job. Inspection services shall be provided for activities dealing with site preparation, foundation, masonry, structural steel, interior wall partitions, millwrights, pipefitting, floors, doors, mechanical systems, roofing, electrical systems, controls systems, painting and coatings, heating, ventilation and air conditioning systems. Construction inspection functions include, but are not limited to; technical inspection, site coordination/facilitation, construction contract administration support, radiographic monitoring, pre-award services, safety, task order information management, and warranty issues. These services and functions shall be provided both at LaRC and at remote shops and vendor locations. In addition to their primary responsibilities, construction inspectors provide code compliance monitoring, and many other services designed to optimize the timeliness, quality and cost of work performed at Langley Research Center (LaRC).

- Deliverables -

As a quick reference aid, the construction inspection deliverables discussed in the "Scope of Work" sections are listed below:

Section A: Inspection plans, non-compliance forms, "reportable event" log entries, "inspection-as-built" drawings and specs., test results, field verifications, and "red-line" drawings.

Section B: The processing of utility outage request forms, digging permits and confined space entry permits and the issuance of work permits and overtime reports.

Section C: Contractor performance log, submittal file, work list, completion check list, contract evaluation form, certified payroll report, invoice log, and task order closeout report.

Section D: Time, location and radiation level logbook entries.

Section E: Pre-construction spec. review evaluations.

Section F: Monthly report of noted construction site safety violations.

Section G: Task order management database.

Section H: Construction inspection records.

Technical Inspection
(Section A)

Quality Assurance Planning

Each inspector must familiarize himself in detail with all the contract requirements, plans and specifications. The contract drawings and specifications shall be studied and any points not understood should be discussed for clarification. An inspection plan shall be developed based on contract requirements, risk assessment and other significant inspection points supplied by the Government. The inspection plan will list the level of inspection required and shall be submitted to the Government representative (TM, Inspection TAM) for review. It is important that each inspector have a thorough understanding of the contractual and technical requirements of the work, including shop drawings, and submittals. Quality Assurance Planning shall consider contract modifications and amendments such as; EFDC's and RFC's (See LMS OP 5692).

Verification of Contract Compliance

The inspector's primary responsibility is to verify that the work in place conforms to acceptable industry standards and is in compliance with the contract plans and specifications. Verification shall be achieved through some or any combination of the following "level of inspection" techniques:

1) Acceptance Inspection - inspection of the finished product without significant attention paid to the installation process. Acceptance inspection includes verifying materials prior to installation, verifying test results, and conducting final inspections of the finished work.
2) Point Inspection - verification of workmanship at established milestones as noted in the plans and specs. It also includes rough-in and phase inspections of the type which precede an "Okay to cover" order. Examples: between paint coatings, rough-ins, and fabrication fit-ups.
3) Methods Inspection - verification of construction procedures and methods employed by the contractor and his tradesman with specified practice. Examples: Placing structural concrete, process piping and steel fabrication, and erection of structural masonry.
4) Full Time Inspection - inspection support whenever the contractor is actively working. Examples: high voltage splicing, air balance/control set-up work.

The "level of inspection" will be determined by the inspection team to meet inspection criteria contained in the task order. The task order will take into account scope of work and availability of funds.

In addition to "level of inspection" techniques, functional checks shall be performed to verify that the newly constructed system operates as designed. Witness functional checks range from verification of circuit breakers, switches, control valves, alarm panels, and operation of complex control circuits. These checks need to be coordinated with the cognizant Government and construction contractor representative to eliminate interference with other operations. No system shall be operated in an unsafe mode and all safety precautions shall be taken, including "red-tag" requirements.

Inspectors have no authority to authorize deviations from contract requirements, to interfere with the methods of performance by the construction contractor, or to issue instruction directly to any contractor personnel, unless the methods being used are unsafe. Non-compliance with requirements, and unacceptable performance or safety violations shall be reported to the appropriate NASA personnel in a timely manner. The construction contractor's superintendent shall also be notified of any deviations from the contract requirements so that corrective action can be taken. It is counter-productive to wait and notify the contractor of discrepancies at a later date when corrective action becomes difficult and costly. **Therefore, timely discovery and reporting of non-complying work is critical.** If the contractor is unwilling or unable to comply, the inspector should generate a non-compliance form, as described in the QA/QC Documentation section of this manual, which details the discrepancy and forward to the NASA Inspection TAM and cognizant NASA Technical Representative (COTR or TM) for signature.

The Government's requirement is that contract work conforms in all respects with the contract plans and specifications and that workmanship conforms to established industry standards. Inferior workmanship will not be accepted. The plans and specifications should not be considered as desirable goals, but rather as minimum standards, which must be met or exceeded. If quality is to be achieved, competent inspection must be applied to the materials and workmanship of each project.

QA/QC Documentation

In addition to verification of contract compliance, inspectors shall attest and document that work in place complies with contract documents and maintain a logbook of "reportable events". Construction activities which are considered "reportable events" consist of acceptance tests, critical path delays, contract change orders, non-complying work, materials inspections, request for information (RFI's), significant meetings, utility outages, and work permits, as well as other atypical construction activities. Reportable events shall be recorded on the Construction Services Record, NASA-FSED Form 1050 *(attach.1)* and shall be maintained for review.

Other QA/QC documentation pertinent to contract compliance includes inspection-as-builts and inspection reports. Inspection as-builts are contract drawings, which have been marked and dated by the inspector to indicate work inspected and accepted. Inspection as-builts shall be supplemented by other inspection reports and relevant documents as appropriate, including concrete test reports and delivery tickets, material certifications, hydrostatic and pneumatic test reports and welding inspection documents. Inspection as-builts and inspection reports shall accompany the Inspector Construction Logbook and shall be maintained for review.

When inspectors discover a deficiency, every effort should be made to convince the contractor of the deficiency by noting the applicable specifications and/or contract drawings. Any unresolved deviations from contract drawings/specifications or unacceptable workmanship shall be considered non-complying work. Non complying work shall be documented on Noncompliance Reports, NASA Langley Form (LF 254) (Formal Contracts). Noncompliance reports shall contain a brief description of the deviation, specification or drawing number, and recommended action. The appropriate signatures shall be obtained and the report distributed to the contracting officer in a timely manner.

Special Inspections

In addition to visual inspections and functional checks, inspectors are required to perform special inspections for systems maintained under the Configuration Management plan. The Configuration Management plan is described in the Langley Policy Guide (LaPG1740.4). Any special inspection requirements will be noted on the inspection request form and authorized through the inspection task order.

Special inspection requirements include verification of point to point (P2P) wiring checks on electrical systems, field verification of construction as-built/red-line drawings, and asbestos/lead containment inspection. Field verified construction drawings would be submitted to the COTR or TM to be incorporated into the Facility Baseline List (FBL). Any existing Configuration Controlled Documents (CCD) affected by construction are typically "red-lined" by the NASA TM, listed on a Change Notification Sheet (CNS) and submitted to the NASA Facility Coordinator or Facility Safety Head. However, the NASA TM may choose to approve additional construction management efforts for the inspector to "red-line" existing CCD drawings. This request should be coordinated through the NASA Inspection TAM who will issue a revision to the inspection task order.

Electrical inspectors will contact appropriate maintenance contract (FESS) personnel whenever a power meter is removed and/or a new power meter or substation circuit breaker is calibrated and tested by a construction contractor under their surveillance.

Technical Consultation

Inspectors are called upon to advise and suggest solutions to technical and administrative problems. They interface with NASA and contract personnel on a daily basis and are requested to attend meetings and conferences. Inspectors are a valuable source of information and provide input, which facilitates the construction process. They are asked to provide evaluative comments on job progress, perform field surveys to gather data and attest to the reasonableness of construction contract change order (RFC's) man-hour estimates. The information they supply is used when responding to contractor requests for information (RFI's) and contractor overtime requests.

Site Coordination / Facilitation
(Section B)

Inspectors shall facilitate construction contractor site activities, which interface with ongoing NASA operations to include utility outages, permits, and security. Inspectors shall facilitate the construction process within their area of expertise. Inspection services should make it easier for all parties to complete the project on time and within the specified budget.

Utility Outages
The facility coordinator shall be briefed and consulted when requesting outages, which may affect other operations within the facility. Any work that requires securing water, air, and steam, electrical or fire suppression systems shall be documented on the FSSD form OSD N-1437 *(attach. 3)* and submitted to the appropriate NASA personnel. Localized outages of facility sub-systems can be obtained by direct request to the facility coordinator. Outages requiring red "hold-off" tags will be the responsibility of the safety operator/inspector and are discussed in the safety section of this manual.

Permits
Inspectors shall facilitate the acquisition of work permits, digging permits, hot work permits, and confined space permits. Work permits *(attach. 4)* shall be obtained for each construction project and shall contain the construction contractors name, location of work and expected start and finish dates. The permit will be posted at the job site and a copy of the permit given to the facility coordinator.

Inspectors shall facilitate the acquisition of digging permits, which are required for any work that exceeds six inches of subsurface penetration and is issued by the NASA subsurface utility coordinator. Surveyors will locate and mark underground utilities prior to issuing permits and shall again be notified prior to backfilling. Digging permits shall be posted at the job site until backfilling is complete. Where appropriate and when funded to do so, inspectors shall stay on site to verify that the construction contractor hand digs to expose the subsurface utilities.

Inspectors shall facilitate the acquisition of hot work permits in accordance with LaPG 1710.11, "LaRC Fire Protection Program" and NSS 1740.11, "NASA Safety Standard for

Fire Protection." For all welding and cutting operations including, but not limited to, the use of acetylene and propane torches, heat guns, grinders, electric arc welders, and activities such as brazing.

Confined space entry is defined in Section 01060 of the Construction Contract Specifications. It requires approval by the LaRC Safety Manager and the issuance of a Confined Space Entry Permit. Prior to performing any operations requiring personnel to enter to such confined spaces, the Contractor shall first notify the cognizant Inspector of such intent at least 5 days in advance of the work. The Contractor shall provide a "Confined Space Entry Permit". The "Confined Space Entry Permit" requires the construction contractor to specify the procedures intended for use to insure that continuous atmospheric testing is accomplished and that the contractor has designated confined space monitors to insure worker safety. Once approved, the permit shall be conspicuously posted at the work site during all confined space work activities.

Security

Inspectors are required to report site security concerns to the NASA security office and shall report any unlawful or illegal activities. After hours or overtime work in secured facilities, badge and pass clearances and traffic control requirements shall be coordinated with the appropriate security personnel. During construction, inspectors may be requested to provide escort services in secured areas, however inspectors are not security guards and therefore are not liable for physical security.

Overtime

Contract completion dates are normally set so as not to require work in excess of eight hours per day and 40 hours per week. In order to ensure that the contract work is being accomplished without undo hardship on the user and to permit the inspector to verify contract compliance, normal working hours are established for each contract and are typically cited in Section 01011 of the Construction Contract Specifications. Operational commitments sometimes demand work be performed outside normal working hours.

Unless special scheduling requirements are specified, the intent is for the contractor to do the work within the hours allotted. However, due to varying site conditions or schedule delays, the contractor may request permission to work overtime. The requirements for overtime requests are described in the Construction Contract Spec. Section 01011 and shall be coordinated through the assigned inspector. The inspector will then verify with the project TM that the work being performed requires overtime. The inspector will then submit an overtime request form from the construction contractor for the TAM (Chief Inspector) approval. The Construction Services Unit (CSU) shall prepare and submit to the NASA Inspection TAM (Chief Inspector) an overtime report listing all contractors and inspectors who request overtime. Once approved, the request is signed and returned to the CSU for distribution to NASA security, badge and pass office, duty officer, and the construction contractor.

Construction Contract Administration Support
(Section C)

Inspection services provide support to various construction contract administration functions. These services include collecting and reviewing of certified payrolls and progress payments, documenting construction contractor performance, attending pre-construction conferences and processing contract closeout documents.

Certified Payrolls

Certified payroll submittals are required under Federal Acquisition Regulations (FAR) and related Davis Bacon laws for construction contracts. Inspectors shall collect, date, review and attest to the accuracy of certified payrolls within fifteen (15) calendar days. Payrolls, which do not match the wage determination rate, as defined by the Department of Labor, shall be returned for correction. Any issues, which cannot be resolved, shall be referred to the NASA Industry Relations Office. Once reviewed, the certified payrolls shall be forwarded to engineering files. A log of certified payrolls on C of F projects will be maintained throughout the entire task order's performance. At the closeout of each task order a report will be submitted to the appropriate NASA official. Certified payrolls may not be required on supply and maintenance type contracts.

Progress Payments

Section 01300 of the Construction Contract Specifications requires construction contractors to submit monthly progress payments (invoices). Inspectors shall receive progress payment submittals from NASA acquisition for review and verification. Inspectors shall verify that "percent complete" claims are reasonable and accurate based on site visits, contract schedule and knowledge of construction progress and that only approved materials are considered for payment. Any exceptions shall be noted and referred to the appropriate NASA personnel (COTR) for changes. The required signatures shall be obtained and the progress payment returned to acquisition within ten (10) calendar days. Final payments will not be approved until the construction contractor has submitted accurate as-built drawings. A log of progress payments on C of F projects will be maintained throughout the entire task order's performance. At the closeout of each task order a report will be submitted to the appropriate NASA official. Progress payments may not be required on supply and maintenance type contracts.

Contractor Performance Documentation (Logbook)

When new contracts are awarded, inspectors shall establish a construction logbook which contains the project name, contract number, task order number, name of assigned inspectors and the construction contractor's name. The logbook will serve as the collection point for contractor performance documentation, daily construction reports supplied by the construction contractor *(reference form LF-255, Daily Construction Report)* and all QA/QC documentation which was previously defined in the "Technical Inspection" (section A) of this manual. The project inspection team shall maintain this

system of records and reports and shall make them available for review. At the completion of the contract, the logbooks shall be submitted for review by the NASA Inspection TAM and forwarded to the Contract Administrator.

In addition to construction logbooks, the inspection team shall establish and maintain a file of all contract submittals and modifications. Submittals shall be referenced during the inspection process to verify material acceptance and contract compliance. All contract modifications shall be incorporated into the inspector's set of plans and specifications and shall be used in the inspection process.

Pre-Construction Conference

The purpose of the pre-construction conference is to establish administrative procedures, which are to be followed in the execution of the contract and are a mandatory requirement as cited in Section 01011 of the NASA Construction Contract Specification. Pre-construction conferences are designed to introduce the construction contractors to the key project personnel from NASA and the assigned inspector.

The assigned lead inspector for each project shall attend pre-construction conferences. While in attendance, the inspector shall have a copy of the contract plans and specifications and shall be prepared to discuss job related inspection concerns and receive pertinent information, which may impact his job. Pre-construction conferences will be scheduled by the Contracting Officer who will notify the Construction Services Unit of the date, time and place.

Contract Closeout

Closeout will be accomplished using LMS-OP-5693-01. When the construction contractor has completed work and a final inspection has been requested, the inspection team will document all outstanding work items in a Work List report. Prior to final inspection, the Work List will be distributed to the NASA Contracting Officer (CO), TM and the construction contractor. Based upon the contents of the Work List, the CO can: (1) elect to continue with the final inspection, or (2) advise the contractor that the work is not substantially complete and the final inspection rescheduled. If a final is held, the TPE, Lead Inspector and Contractor will create a Punchlist *(by using form LMS-OP-5693-01 provided by the NASA Contract Administrator)* by adding to or modifying/deleting items from the Work List, based upon the judgment of those involved in the final inspection. If a final is not held, the CO will instruct the contractor to request a final when the work is complete (*LMS-OP-5693-01).*

The Punchlist will be transmitted to the contractor with a copy to the inspector. The Contracting Officer will specify a time for completion of the Punchlist and will be contacted by the contractor when completed. The inspector shall inspect the completed Punchlist within 24 hours after being notified by the Contracting Officer that it is complete. The Construction Contract Completion Check List FSED-CCL (*LMS-OP-*

5693-01 will be signed by the inspector after the punchlist inspection is successfully completed or, if no punchlist is generated, at the final inspection. (*LMS-OP-5693-01).* At completion, the Construction Services Unit will collect and submit the inspection logbooks with logbook transferal letter, certified payroll report, contract modifications log, invoice log and task order close out report to the NASA Inspection TAM. The Inspection TAM will review and evaluate the inspection task order and forward the close out documents to the NASA Specs. and Contracts Team. The logbooks will be sent to the Contracting Officer for filing per (*LMS-OP-5693-01).*

Radiographic Monitoring
(Section D)

NASA construction contracts often require the use of contract radiography operations for the nondestructive testing (NDT) of welds, castings and piping. When the contractor is ready to radiograph his welding work, he will verbally request radiographic monitoring support from the inspector as required by contract spec section 01060 and NASA LAPG 1710.5. The assigned inspector shall coordinate this request with the inspection supervisor who develops a manpower plan. The inspection supervisor can assign an NDT monitor or an NDT certified inspector to monitor the site. All work for this service shall be authorized by an inspection task order.

Inspectors and monitors shall read and become familiar with all procedures listed in LAPG 1710.5 V-14 so as to verify strict adherence by the construction contractor. Monitors shall maintain a record of the time, location and radiation levels measured at representative locations on the control area boundary. Measurements shall be made at one-hour intervals during the operation and recorded in the monitor's log.

Pre-Award
(Section E)

Construction phase services are required prior to award of the construction contract. These pre-award services include attendance at site visits, pre-construction conferences, safety briefings, involvement in spec. reviews, and preparation of cost estimates/inspection plan for the remainder of the construction phase services required for the task order.

Site Visits
Construction inspection services provide support for various pre-award activities, such as site visits and spec. reviews. Site visits (job shows) are scheduled to allow potential bidders the opportunity to view the actual job site to collect data, which may be useful in preparing a more accurate cost estimate. The assigned inspector will visit the job site with all of the interested construction contractors and the NASA personnel to answer any job related questions. Time spent on site visits shall be charged to the pre-award task order.

Spec. Review
Design/constructability, reviews are valuable tools in reducing the cost and schedule impacts of changes initiated during construction. The trade knowledge, skills, understanding of the unique needs of Langley Research Center (LaRC), and experience of the inspectors allow them to bring an extremely valuable perspective to pre-construction spec. reviews. The spec. reviews are the most cost efficient opportunity for the project to benefit from the experience and expertise of the construction inspectors. Therefore, inspectors shall provide constructability comments to pre-award spec. reviews.

The assigned inspector receives two sets of plans and specifications approximately one week prior to the spec. review meeting. He separates the spec. packages by trade and delivers them to the appropriate trade specific inspector assigned to that job. The trade inspector critiques the spec. section related to his area of expertise and makes recommendations based on lessons learned from previous jobs. He also looks for drawing discrepancies, unrealistic or unnecessary spec. requirements, and/or requirements which were inadvertently omitted. In this respect, the following checklist has been prepared:

1. Are existing site conditions accurately shown on drawings?
2. Is completion time reasonable considering job constraints, such as work scheduling restrictions and seasonality of the work?
3. Is the Work Base Schedule (WBS) for contractor's progress schedule appropriate?
4. Are conditions and procedures for obtaining access to the jobsite clearly set forth?
5. Is Govt. furnished property clearly identified? Availability dates indicated?
6. Are material storage and lay down areas defined?
7. Are restrictions affecting the contractors ability to perform clearly defined (e.g., availability of parking, material delivery routes, requirements for working in occupied spaces)?
8. Ensure that any landscaping requirements for the planting season are commensurate with contract duration.
9. Comment on any observed conflicts between the plans and specifications, or between various disciplines. Are electrical and mechanical system layouts compatible?
10. Value engineering proposals (i.e., can significant savings be realized using different methods or materials than those specified?)
11. Are lessons learned on previous projects being applied?

When completed, the marked up set of plans and specs. are then returned to the NASA Inspection TAM for review. Time spent on spec. review evaluations shall be charged to the pre-award task order.

Task Order Cost Estimates

The support service contractor shall develop cost estimates for the entire list of construction phase services requested for the construction project. These estimates will be used in negotiations with the Government to determine the Target Cost for each task order.

Safety
(Section F)

Construction Site

Construction site safety is the responsibility of the construction contractor and is enforced by the NASA Langley Research Center (LaRC) Office of Safety and Facility Assurance (OSFA) and OSHA. Inspectors are required to notify the appropriate parties whenever safety violations or unsafe practices become evident while conducting technical or administrative inspection duties. It is not the inspector's responsibility to look for safety violations or conduct daily safety inspections. However, the inspector is responsible for verification of contract compliance requirements stated in the specification safety section (01060) and can issue a stop work request if imminent danger exists.

Obvious safety violations shall be reported to the site superintendent for immediate resolution. If the violation is not able to be resolved, or continues to occur, the NASA Langley Research Center (LaRC) Office of Safety and Facility Assurance shall be contacted.

Projects which involve environmental safety hazards, such as PCB's, asbestos and lead paint, shall identify the hazard in the task order and require close monitoring for compliance. Any violations, which may cause leakage or contamination, require timely response. The inspector shall verify that the contaminated area is clear and secure and immediately contact the appropriate Office of Safety, Environment, and Mission Assurance (OSEMA) personnel.

All inspectors shall read and become familiar with the NASA LaRC Safety Clearance Procedures (RED-TAG) (LPG-1710.10) safety program and be aware that any violation is grounds for dismissal of the offending individual. The inspection staff shall have NASA LaRC certified Safety Operators who are qualified to install and remove red "hold-off" tags on low voltage (600v and below) power systems and low pressure piping (350 psi and below) systems for construction contracts only. Prior to installing red "hold-off" tags, the inspector shall contact the Facility Coordinator or his alternate to receive the RED-TAG stub and shall have the Facility Coordinator initial the inspection log sheet attesting to the fact that the proposed outage is acceptable. Inspectors shall forward all other safety clearance requests to the appropriate NASA Safety Operator or contact the NASA duty officer for coordination of safety clearances.

Safety Briefing

The prime construction contractor and all subcontractors are required to attend a safety briefing prior to any site work as stated in Section 01060 of the Construction Contract Specifications. Badges and vehicle passes will not be issued until the on-site superintendent has been to the safety briefing and taken a completed OSEMA safety briefing form to the Badge and Pass Office. The contractor shall coordinate safety briefings through the assigned inspector that will meet and escort the contractor to the safety briefing. The inspector shall have with him a copy of the contract specs. and shall be prepared to discuss potential job specific safety concerns.

Task Order Management Information System
(Section G)

As a Construction Management service the Construction Services Unit (CSU) shall maintain a computer based Task Order Management Information System (TOMIS) and an electronic file management process, which includes periodic backup of database records. Database software shall be network version, DOS or Windows ready and as a minimum, be able to run on a Pentium PC. The task order database shall contain contract and task order cost data, schedule information, and project information. Each new job received in the CSU shall be entered into TOMIS and shall be accessible through a local area network.

TOMIS shall be able to display current on line data to the NASA Inspection TAM with read/write capability and shall be used to generate hard copy reports when requested. Access to TOMIS shall be controlled so as to maintain hardware and software integrity.

Warranty Issues
(Section H)

Construction contractors are obligated, for a one-year warranty period (from Beneficial Occupancy Date (BOD)), to return for rework or repair of faulty equipment. Customers typically contact the project inspector to report failures that are considered warranty related. Inspectors shall then determine whether the work is covered by the warranty and inform the customer accordingly. If work is within warranty, the inspector shall contact the construction contractor to schedule a time for rework. If there is not a timely response from the construction contractor the inspector will contact the Contracting Officer Technical Representative (COTR). The COTR will then contact the construction contractor if there is not a timely response, it is his responsibility to contact the Contracting Officer (CO). If expired, the inspector shall direct the customer to the appropriate NASA work control personnel.

The inspector shall arrange for appropriate badges and passes and shall be available to escort or meet the contractor at the site when necessary. The inspector shall coordinate any additional support reasonably required to resolve the problem. All "call back" warranty work shall be documented on Construction Services Record, NASA-FSED form 1050 *(attach.1)* and shall be charged to the warranty task order.

SUPPORT SERVICE CONTRACT ADMINISTRATION

- Deliverables -

The construction inspection deliverables that are discussed in the following section include; inspection cost estimates and cost to complete estimates.

As stated in the introduction section of this manual, construction inspectors are support service contractors funded through an Incentive Fee contract arrangement with NASA Langley Research Center (LaRC). Services are requested and paid for by a direct cost accounting, task order approach. Construction inspection services are requested, estimated, managed, funded and evaluated on an individual task order basis.

NASA Langley Research Center (LaRC) personnel shall request construction inspection services by submitting a funded task order and scope of work to the NASA FSED Inspection TAM *(Langley Form LF-322, "Construction Phase Support Task Order")*. Once approved, the task order is routed through the COTR and applied to the support service contract. A copy of the task order and scope of work are then transmitted to the CSU at MS 428. At that time, a new database record is entered using the task order number and other project data as described in the "Task Order Management Information System" (TOMIS) (section G) of this manual. Typically, the original task order is funded for Pre-Award services (section E) with subsequent funding and scope changes as the job progresses.

Work done as part of the Pre-Award services will be issued through a blanket task order number. The remaining services to be provided for each project will be issued through individual task orders. The services to be included and the Target Cost will be negotiated prior to award and whenever task order revisions are necessary.

The NASA Inspection TAM and the support service contractor will develop independent cost estimates, which will be used during negotiations to establish an appropriate target cost. The support service contractor will use the estimate generated and paid for as part of the Pre-Award services. Estimates shall be based on sound judgment and knowledge of the job, realized that differing site conditions, poor contractor performance and construction change orders prolong performance period and tend to increase inspection cost. The Inspection TAM will discuss the estimate and seek concurrence from the project TPE prior to funding.

To insure funding accountability for each task order, inspectors shall charge time to the inspection task order number related to the project they are inspecting. As available funds decrease, the CSU may provide an estimate to complete worksheet (ETC). An explanation of changed conditions, which justify revising the target cost, will be provided, if appropriate. NASA must then revise the target cost and/or the authorized funding or direct the support service contractor to budget the remaining hours to complete the task

Once the project has been completed, closeout documentation submitted and all task order charges applied, the COTR is requested to close the task. The database record is archived to a closed status and no additional charges incurred. The NASA COTR and the Support Service Contract Manager will sign the original task order in the closeout block.

CSU inspectors shall maintain a professional, working relationship with all internal and external customers and shall communicate to NASA potential problems and continuous improvement suggestions related to the support service contract agreement. NASA must be confident that inspections are being performed satisfactorily within the ethical and fiscal guidelines established for public service. Therefore, client confidence is an extremely important product of the CSU. Additional support service contract information related to technical performance, business and technical management, cost and safety, can be found in the Contract Management Plan and Incentive Fee Evaluation Plan.

EVALUATION METRICS

Construction inspection task orders are rated for quality, timeliness and cost of performance. The overall rating of the Performance–Metrics determines the incentive fee paid to the support service contractor at semi-annual periods. Since the incentive fee process is instrumental in improving the support service contractor's performance, it is imperative to provide fair and tangible metrics, as well as detailed comments/justification to support performance ratings. The evaluation metrics are established by the contract.

EXHIBIT K – LANGLEY FORM 251

Inspection Menu of Services

(Complete this form and deliver or mail to Task Area Manager at MS 447.)

:	Task No.:

Contract Data

act No.:	Project Title:	Contractor:
-		

mance Period (days):	Award Amount:	COTR/PM:	Contracting Officer:

e: Planning inspection services will be an important element of the inspection strategy. Inspectors are required to have an ection plan for each project. (In addition to specifications and drawings). As PM of this project you and your supporting team ctrical, mechanical, structural) are requested to list significant areas of inspection. These areas are what you feel are critical ie construction process. Please list below any other significant inspection points that should be preformed, witnessed, fied, and recorded.

Construction Services

Pre-Award/Preconstruction Services

- ☐ Spec Reviews
- ☐ Site Visits (Job Show)
- ☐ Attend Pre-Construction Conference
- ☐ Escort to Safety Briefing

Site Coordination/Facilitation

- ☐ Utility Outages
- ☐ Obtain Permits
- ☐ Security Escort
- ☐ Overtime

Technical Inspection

- ☐ Quality Assurance/Inspection Plan
- ☐ Verification of Contract Compliance (QA/QC)
- ☐ Equipment Documentation
- ☐ QA/QC Documentation

- ☐ Special Inspections
- ☐ Technical Consultation
- ☐ Final Inspection/Contract Closeout
- ☐ Attend Weekly/Bi-weekly Progress Meetings

ER COMMENTS:	No. of welded joints and size
-ray requirements (approximate number of welded joints and size)	
onfiguration Control Requirements	☐ Yes ☐ No
(if yes, approximate number of drawings)	
vertime and/or shift change requirement; e.g., utility outages	☐ Yes ☐ No
ercent equipment cost vs. total contract cost	%
rojected date of off-site inspections (shop visits)	

ER SIGNIFICANT INSPECTION POINTS:

Man-hours x Rate ($/hr) = Cost:

EXHIBIT L - LARC BUILDING LAYERING CONVENTION

Building Layering Convention: NASA uses geometric data from AutoCAD building files in the development of GIS databases. In order to increase efficiency to extract features from the typical multi-layer building drawing files, the Contractor shall implement the specified layering convention.

(a) GIS data shall provide the basis for all designs that address Building or Room configurations.

(b) GIS data is available from GIS server or web-based Locator (http://gis-www.larc.nasa.gov/).

(c) CAD design files describing changes in Building or Room configuration shall provide basic CAD features that are broke out to the following layers to reflect changes from baseline GIS geometry. Linear features shall be continuous with closed intersections and no "dangles" or "fuzzy" nodes.

(d) Copy of final design file for buildings or room modifications (dwg or dxf format) shall be forwarded to GIS for update of GIS database as part of final deliverable.

(e) Layering convention:

facility = exterior facility wall (polygon)
wall = walls (line)
room = rooms (polygon)
cubicles = partition walls (line)
roof = roof levels (polygon)
site = outside associated features as ramps, stairs, cooling towers, etc. (line)
window = windows (line)
door = doors (line)
stairs = stairs and elevators (line and annotation)
structural = features such as I-Beams, large stationary equipment, etc (line)
plumbing = plumbing fixtures (line, point in future)
handicap = handicap modifications (point and annotation)
electrical = electrical panel boxes (point and annotation)
fire = fire equipment (point and annotation)
jack = communication jacks (point and annotation)
drains = floor drains (point and annotation)
equipment = equipment such as HVAC/pumps (point and annotation)
text = text, scale bar, border and associated features (line and annotation)

Mechanical Drafting Standards for the Mechanical Engineering Team

January 1996

National Aeronautics and Space Administration
Langley Research Center
Facility Systems Engineering Division
Hampton, VA 23681

Issue & Revision Record		
Revision No.	Date	Description
--	1/96	Original Issue

1.0 Introduction and Scope

This manual has been developed to provide a set of standard guidelines to be followed for mechanical drafting in the Mechanical Engineering Team of the Facility Systems Engineering Division. All mechanical drawings for the Mechanical Engineering Team shall be completed in accordance with this manual.

The intent of this manual is to supplement the Drawing Requirements Manual[1] (MIL-STD-100E) by addressing the topics that are specific to mechanical drawings; highlight exceptions to the manual; and identify a standard format when options are presented in the manual.

In case of difference between the Drawing Requirements Manual (MIL-STD-100E) and the Mechanical Drafting Standards, the Mechanical Drafting Standards shall govern.

This standard is written for drawings to be generated in English units. Requirements for metric drawings will be defined in a future revision of the Mechanical Drafting Standards.

[1] Jerome H. Lieblich, Drawing Requirements Manual for Departments of Defense & Industry, 7th Ed., Global Engineering Documents, 1990

2.0 Drafting Practices

2.1 Principals of Projection

All drawings (including metric drawings) shall be developed using the third angle projection method.

2.2 New Drawings

New drawings shall be in accordance with this manual and with the following:

a. Do not show unnecessary views.

b. All drawings shall be on D size (22" x 34") sheets.

2.3 Scale of Drawings

Drawings shall be shown full size whenever possible. When it is not practical to show a drawing full size, the ratio of the size of the object as drawn to its full size shall be expressed as follows:

Scale	Scale Entry
Full Size	1/1 (FULL)
Half Size	1/2
Quarter Size	1/4
Eighth Size	1/8
Sixteenth Size	1/16
Double Size	2/1
Four Times Size	4/1
Eight Times Size	8/1
Ten Times Size	10/1

2.4 Out-of Scale Dimensions

When dimensional changes are made on released drawings, and it is not practical to change the detail to agree with the new dimension, the dimension is underscored with a straight line to indicate the out-of scale condition.

2.5 Print Size, Fonts, & Layers for AutoCAD Drawings

All lettering shall be upper case. The font used in AutoCAD drawings shall be ROMANS. Print size and layers shall conform to the following specifications as shown on Example 1:

Title Block

	Size	Layer
Project Title	.15	BOLDTXT
Drawing Title	.15	BOLDTXT
Building Number	.15	BOLDTXT
Sheet Number	.15	BOLDTXT
Drawing Number	.25	BOLDTXT
Latest Revision	.25	BOLDTXT
Surface Finish	.15	BOLDTXT
Angular Tolerance	.15	BOLDTXT
Approvals	.10	TXT

Parts List

	Size	Layer
"PARTS LIST" Heading	.15	BOLDTXT
Other Headings	.10	BOLDTXT
Parts List Information	.15	TXT

Revision Block

	Size	Layer
Revision Block Information	.10	TXT

Part Identification - Fabricated Parts	Size	Layer
Part Number	.20	BOLDTXT
Part Name	.20	BOLDTXT
Scale	.15	TXT
Number Required	.15	TXT
Material	.15	TXT
Next Assembly	.15	TXT

Part Identification - Commercial Items	Size	Layer
Part Number	.20	BOLDTXT

Sections and Views (Taken)	Size	Layer
Section (View) Letter	.20	BOLDTXT
Sheet Numbers	.15	BOLDTXT

Sections and Views (Shown)	Size	Layer
Section (View) Letter	.20	BOLDTXT
Sheet Numbers	.15	BOLDTXT
"SECTION" ("VIEW") Label	.20	BOLDTXT
Scale	.15	TXT

Notes	Size	Layer
"NOTES" Heading	.20	BOLDTXT
"GENERAL NOTES" Heading	.20	BOLDTXT
Note Text	.15	TXT
Note Number	.15	TXT
Indexed Notes	.15	TXT

Revision Callouts

	Size	Layer
Revision Letter	.15	BOLDTXT
Number of Occurrences	.10	BOLDTXT

Note: Revision letter and subscript enclosed in hexagon.

Cover Sheet

	Size	Layer
Project Title	.75	BOLDTXT

2.6 Arrowheads

Arrowheads for dimensions, leaders, sections and views shall be as shown in Example 1.

2.7 Leader Lines Used with Notes

Leaders terminate at the lettering beginning or end with a line not less than .125 inches long, parallel to the lettering of the note and are extended at a constant angle to the part or portion affected by the note.

2.8 Leader Lines That Cross Dimension Lines

Leader lines should not cross dimension or other leader lines. When it is unavoidable that a leader cross a dimension line, the leader line shall be broken at the point of intersection.

2.9 Sections

Section callouts shall be as shown in Example 1.

2.10 Section Crosshatching

Sections shall be crosshatched in accordance with the material specification.

Crosshatching for materials shall be in accordance with Example 2.

2.11 Views

View callouts shall be as shown in Example 1.

2.12 Metric

Requirements for metric drawings will be defined in a future revision to the Mechanical Drafting Standards.

3.0 Types of Engineering Drawings

3.1 Assembly Drawings

An assembly drawing shows the assembled design, with all detailed parts and/or subassemblies shown in their functional positions.

An assembly drawing depicts the assembled relationship of: (a) two or more parts; (b) a combination of parts and subordinate assemblies, or (c) a group of assemblies required to form an assembly of higher order. The drawing shall show sufficient detail to show the relationship between each subordinate assembly and part. The assembly drawing shall include: (a) identification of commercial parts which are specified in detail in the parts list; (b) transportation to the drawing on which the fabricated parts are detailed. Assembly drawings may include overall system and interface dimensions or other relevant information.

The distinction between an assembly and a subassembly is determined by the individual application. An assembly in one instance may be a subassembly in another where it forms a portion of an assembly.

3.2 Subassembly Drawings

A subassembly drawing depicts one or more parts which form a portion of an assembled unit.

3.3 Detail Drawings

A detail drawing depicts all necessary information for fabrication of a complete end item ready for application in an assembly or subassembly.

Detail drawings contain all information necessary for fabrication, finish, marking, and inspection.

Parts shall be identified by a dash (-) number for each separate part.

Weldments are considered a part and shall be designated with a dash (-) number.

Detail drawings shall have a minimum of 1" space between details.

3.4 Installation Drawings

An installation drawing shows the installed and assembled position of an item relative to its supporting structure or to associated items.

An installation drawing shall contain the following items:

a. List of items to be installed.

b. Locating dimensions and associated tolerances.

c. Types and quantities of attachment.

d. Process and special installation requirements.

e. Adjustment data.

f. Special test or inspection requirements.

g. Detail definition of special installation parts.

h. Installed items shall be shown in solid lines; existing items shall be shown in phantom lines.

i. Interface definition to existing components.

j. An installation drawing shall contain a parts list to establish the requirements for the installation hardware.

k. Interface mounting and mating information (i.e. dimensions for location of attachment hardware).

l. Information necessary for preparation of foundation plans, including mounting hardware details.

m. Identification of applicable assembly drawings.

n. Demolition requirements.

3.5 Envelope Drawings

An envelope drawing depicts an item which specifies a configuration and performance envelope, without details of internal construction. All features other than those shown on the drawing are left to the fabricator to meet the specified design requirements and performance data.

An envelope drawing shall define all interface requirements in exact detail.

Typically, an envelope drawing would be used for an ASME code stamped pressure vessel.

3.6 Cover Sheet

The cover sheet shall include the project title and the NASA logo as shown in Example 3.

3.7 Drawing Index and General Notes

The drawing index and general notes sheet shall include a drawing index for all drawings in the project, legends, site location, and general notes pertaining to the entire drawing package.

3.8 Drawing Package Organization

The mechanical drawing package shall be assembled as follows:

a. Demolition and Site Preparation Drawings
b. Installation Drawings
c. Assembly Drawings
d. Subassembly Drawings
e. Detail Drawings

The entire project drawing package shall be assembled as follows:

a. Cover Sheet
b. Drawing Index and General Notes
c. Mechanical drawings
d. Structural drawings
e. Process Systems drawings
f. Electrical & Controls drawings

4.0 Dimensions & Tolerances

4.1 Basic Dimension

A basic dimension is a numerical value used to describe the theoretical exact size, shape, or location of a feature. It is the basis from which permissible variations are established by tolerances on other dimensions, in notes or by feature control symbols. Basic dimensions are shown on the drawing enclosed in a rectangle. The use of basic dimensions shall be limited to essential dimensions.

4.2 Reference Dimension

A reference dimension is a dimension that has been specified elsewhere on the same drawing or on another drawing. Reference dimensions shall be enclosed in parentheses.

4.3 Fit

Fit dimensions shall be specified on the drawing. The fit designation (e.g. LC1, RC5) shall be included as a reference.

Example: ϕ1/2 NOM MACHINE FOR .0001-.0008 INTERFERENCE (FN1) FIT WITH MATING PART

4.4 Material Condition

The material condition "Regardless of Feature Size" (RFS or S) is the default material condition. The material condition callout is not required.

4.5 Units of Measure

Dimensions and tolerances shall be expressed in inches and decimal parts of an inch or in angular units. Fasteners and welds shall be expressed in fractions.

4.6 Rules Applicable to Units of Measure

a. Zeros shall not be used before the decimal point for values less than one inch.

b. All decimals shall have a minimum of two digits following the decimal point.

c. A dimension and its tolerance shall have an equal number of digits following the decimal point.

d. Both tolerances shall be specified when using unilateral tolerances.

e. Unilateral and bilateral tolerances used with dimension lines shall show the tolerance following the dimension. Tolerances shall be shown with the plus tolerance above the minus tolerance.

f. When tolerances are specified in general notes, the tolerance may be shown on the same line with the plus tolerance preceding the minus tolerance.

4.7 Rules Applicable to Angular Units

a. Angular dimensions and tolerances shall be expressed in degrees (°) and when necessary, in minutes (') and seconds ("), or in decimal parts of a degree.

b. An angular dimension and its tolerance shall be held to the same unit of measure.

4.8 Standard Tolerances

Dimensions shown without tolerance are controlled by the standard tolerances in the title block, except for stock materials, dimensions on welding symbols, undimensioned angles between lines drawn at 90°, dimensions labeled REF, MAX, MIN, BASIC, and similar dimensions that are otherwise controlled.

4.9 Fundamental Rules of Dimensioning

Dimensioning shall conform to the following rules:

a. Dimension, extension, and leader lines should not cross each other unless absolutely necessary. When it is unavoidable, the leader line shall be broken at the point of intersection.

b. Dimensions are shown in a view that most clearly represents the form of the feature.

c. Sufficient dimensions shall be shown to clearly define size, shape, and position of each feature.

d. A feature shall not be located by more than one toleranced dimension in any one direction.

e. Reference dimensions shall be enclosed in parentheses.

f. Dimensions shall be shown outside the outline of the part.

g. Dimensions shall be selected and arranged to minimize the accumulation of tolerances between related features.

h. Each dimension shall be expressed clearly so that it can be interpreted in only one way.

i. Chain dimensions should be avoided.

j. Center lines, object lines, or extension lines should not be used as dimension lines.

k. Dimensioning to hidden lines shall be avoided.

l. Maximum and minimum limits must be such that parts will assemble and function under all dimensional conditions that are within limits.

m. The word "TYPICAL" or the abbreviation "TYP" may be used when the number of places the dimension applies is indicated.

Example: TYP (2) PLACES

n. Dimensions shall be placed such that there is a minimum of ½" between the part and the dimension.

o. Parts which contain critical alignment dimensions shall be dimensioned as matched parts in lieu of high precision tolerances on individual part details."

4.10 Form Tolerances

Form tolerances shall apply regardless of feature size.

4.11 Metric

Requirements for metric drawings will be defined in a future revision to the Mechanical Drafting Standards.

5.0 Engineering Drawing Format

5.1 Drawing Size

All drawings shall be on D size (22" x 34") sheets.

5.2 Drawing Media

AutoCAD drawings shall be on paper.

5.3 Drawing Scale

Drawings shall be shown full size whenever possible. When it is not practical to show a drawing full size, the ratio of the size of the object as drawn to its full size shall be expressed as follows:

Scale	Scale Entry
Full Size	1/1 (FULL)
Half Size	1/2
Quarter Size	1/4
Eighth Size	1/8
Sixteenth Size	1/16
Double Size	2/1
Four Times Size	4/1
Eight Times Size	8/1
Ten Times Size	10/1

5.4 Continuation Sheets

Continuation sheets of multi-sheet drawings shall have a unique sheet number and a unique drawing number.

5.5 Border

The standard border to be used on all drawings is shown on Example 4.

5.6 Title Block Format

The title block shall be as shown in Example 4.

5.7 General Note Location

Notes shall be located in the upper right hand corner of the drawing as shown in Example 5. Notes shall be numbered consecutively starting with 1 and numbered downward. Notes may be located in the upper left hand corner on drawings containing only notes and a parts list.

5.8 Standard Tolerance Block

This block contains the standard tolerances that apply to specific dimensions as stated in SECTION 4. An angular tolerance shall be entered when required.

5.9 Finish Block

Enter the surface finish required for machined parts.

5.10 Parts List Format

The parts list shall be located in the lower right hand corner of the drawing above the title block. Dimensions for the parts list shall be as shown on Example 5. Specific information on completing the parts list shall be as stated in SECTION 8.

5.11 Revision Block Format

The revision block shall be as shown in Example 4.

5.12 Metric

Requirements for metric drawings will be defined in a future revision to the Mechanical Drafting Standards.

6.0 Drawing & Part Number System

6.1 Sheet Number Assignment

All drawings shall contain a unique sheet number. Mechanical drawing sheet numbers shall be designated with an "M." (Example: M13 = Mechanical drawing, sheet 13)

6.2 Drawing Number Assignment

All drawings shall contain a unique drawing number. Completed drawings shall have a NASA drawing number for drawing file records. NASA drawing numbers will be assigned when the drawings are ready for final sign-off. Transportation between drawings shall be by sheet number.

6.3 Part Numbering System

Each commercial item shall be designated by an item number enclosed in a ½" diameter circle.

Each fabricated part (including subassemblies & weldments) shall be designated by the sheet number followed by a dash number (Ex: M18-5 = Part -5 on sheet M18)

Detail drawings shall identify the first part with -1.

Reference drawings shall be identified by the NASA drawing number.

The part numbering system is shown in Example 5.

7.0 Drawing Notes

7.1 General Notes

General notes are those which apply to the drawing in general and would become repetitive if placed at each point of application.

7.2 Indexed Notes

Indexed notes are those which apply to specific areas of the drawing or parts list. Indexed notes shall be enclosed in a triangle as shown in Example 5.

7.3 Local Notes

Local notes are those which apply directly to a particular portion of a drawing, indicated by local characteristics.

7.4 Project Notes

Project notes are those which apply to the entire project package. Project notes shall be placed on the Drawing Index and General Notes sheet.

7.5 Position and Alignment of Notes

Notes should be positioned horizontally on the drawing. The left end of all lines of a note should be in alignment, except when an opening statement applies to several succeeding incomplete phrases. In this case, the phrases shall be indented.

7.6 Local Notes That Specify Method of Fabrication

Local notes which specify fabrication operations (e.g., DRILL, REAM, TAP, PUNCH, OR BORE) are acceptable when specifying the fabrication technique is critical to the final product.

7.7 Symbols for Local Notes That Describe Features

Symbols for local notes that describe features shall not be used. Acceptable abbreviations for features are as follows:

COUNTERBORE	CBORE
COUNTERSINK	CSK
SPOTFACE	SF
DEEP	DEEP
RADIUS	R
DIAMETER	ϕ

7.8 Location of General Notes

General notes shall be located in the upper right hand corner of the drawing. Notes shall be numbered consecutively starting with 1 and numbered downward. General notes may be placed in the upper left hand corner on drawings containing only general notes and a parts list.

8.0 Parts List Preparation

8.1 Parts List

The parts list shall contain information for commercial components. The parts list shall be located on the assembly and/or subassembly drawing if space permits. If space is limited, the parts list may be shown on a separate sheet immediately following the assembly or subassembly. Each subassembly shall have a separate parts list. The parts list shall contain the item number, material specification, description, part identification number, quantity required per unit, and total quantity required.

8.2 Item Number

The item number block shall contain the item number.

8.3 Material Specification

The material specification block shall contain the material specification for the commercial item.

8.4 Description

The description block shall contain the description of the commercial item and the manufacturer's name of the commercial item.

8.5 Part Identification Number

The part identification number block shall contain the complete catalog part number for the commercial item.

8.6 Quantity Required per Unit

The quantity required per unit block shall contain the quantity required per assembly or subassembly.

8.7 Total Quantity Required

The total required block shall contain the total quantity of items required for all assemblies or subassemblies. This column required for multiple assemblies.

9.0 Thread Representation

9.1 Thread Designation

The designation of standard series threads consists of the following information: nominal size, number of threads per inch, thread series, and thread class.

Nominal size shall be expressed as a fraction for commercially available fasteners.

Example:

1/4-20 UNC-2A

Where:

1/4 = Nominal size
20 = Number of threads per inch
UNC = Thread Form and Series
2A = Thread Class

9.2 Hand Designation

Screw threads are interpreted to mean right hand unless LH, for left hand, is included in the callout.

9.3 Threaded Inserts

Thread inserts shall be specified as follows:

"DRILL & TAP FOR "X" THREADED INSERT"

Where:

"X" is replaced with the appropriate nominal thread size and length

9.4 Abbreviations and Symbols

Abbreviations and symbols for features shall be as follows:

COUNTERBORE..... CBORE
COUNTERSINK.....CSK

SPOTFACE.....SF
DEEP.....DEEP
RADIUS.....R
DIAMETER.....ϕ

9.5 Tap Drill Size and Depth

Except when required by specific design considerations, neither the size nor the depth of the tap drill is included in the thread callout.

9.6 Metric Threads

Requirements for metric threads will be defined in a future revision to the Mechanical Drafting Standards.

10.0 Welding

10.1 Standard Location of Elements of a Welding Symbol

The welding symbol provides the means of placing complete welding information on the drawing. The standard location of elements of a welding symbol is shown in Figure 1.

10.2 Standard Size of a Welding Symbol for Drawing Application

The welding symbol shall be consistent in size on all drawings. The weld size shall be expressed as a fraction for welds less than one inch. The welding symbol shall be in accordance with Example 5.

10.3 Basic Size of Weld Symbols

The dimensions for basic weld symbols are shown in Figures 2 & 3.

10.4 Metric

Requirements for metric drawings will be defined in a future revision to the Mechanical Drafting Standards.

11.0 Drawing Change Procedures

11.1 Revision Status

The revision status of a drawing is identified by an uppercase letter. The first revision issued is identified by the letter "A." Each successive change uses the next letter of the alphabet in sequence, except the letters "I", "O", "Q", "S", and "Z" are never used.

11.2 Drawing Revisions

A revision note shall be placed on every drawing which is revised after the drawing has been approved. The location of the change on the part shall be indicated by the revision letter in a hexagon as shown in Example 5. The revision shall be noted in the revision block as shown in Example 4. Descriptions in the revision block shall be descriptive, but brief. Revision A shall be located in the upper left corner of the revision block. The latest revision to the drawing shall be shown in the "Latest Revision" block of the title block.

11.3 Multiple Changes

Multiple changes to the same drawing incorporated at one time shall be identified by the same revision letter with a numerical subscript as shown in Example 5.

11.4 Changes in General Notes

A general note may be changed if the original purpose is maintained.

11.5 Removing General Notes

When a general note has been removed, the word "REMOVED" shall appear in its place. Once a general note has been removed, the number for that note shall not be reused.

11.6 Revisions to AutoCAD Drawings

The approval signatures and dates on the original drawing shall be replaced with the typed name of the original approver and the typed dates. Original signatures and dates shall appear on the latest revision in the revision block.

12.0 Abbreviations

12.1 Use of Abbreviations

Abbreviations shall be avoided whenever possible. If abbreviations are used, they shall be uniform throughout the drawing package.

12.2 List of Abbreviations

The following list identifies the abbreviations which are acceptable for use on drawings:

Acme Screw Thread	ACME
American Wire Gage	AWG
And	&
As Required	AR
Assembly	ASSY
Basic	BSC
Bearing	BRG
Bolt Circle	BC
Cap Screw	CAP SCR
Center Line	CL
Center of Gravity	CG
Chamfer	CHAM
Class	CL
Clearance	CLR
Clockwise	CW
Counterbore	CBORE
Counterclockwise	CCW
Countersink	CSK
Cylinder	CYL
Deep	DEEP
Diameter	ϕ
Diameter Bolt Circle	DBC
Drawing	DWG
Drill	DRILL
Each	EA
Equal	EQ
Equally Spaced	EQ SP
Existing	EXST
Fahrenheit	F
Foot	FT
Gage	GA

Government	GOVT
Government Furnished Equipment	GFE
Grade	GR
Hexagon	HEX
Hexagonal Head	HEX HD
Inside Diameter	ID
Left Hand	LH
Long	LG
Material	MATL
Maximum	MAX
Nominal	NOM
Not to Scale	NTS
Outside Diameter	OD
Places	PLCS
Plate	PL
Quantity	QTY
Radius	R
Reference	REF
Required	REQD
Right Hand	RH
Root Mean Square	RMS
Screw	SCR
Sheet	SH
Socket Head Cap Screw	SHCS
Spotface	SF
Stainless Steel	SS
Standard	STD
Steel	STL
Stock	STK
Spherical	SPH
Symmetrical	SYM
Thick	THK
Threads Per Inch	TPI
Through	THRU
Tolerance	TOL
Total Indicator Reading	TIR
Typical	TYP
Unified Coarse (thread)	UNC
Unified Extra Fine (thread)	UNEF
Unified Fine (thread)	UNF

13.0 Project Drawing Package

13.1 Project Coordination

The Technical Project Engineer (TPE) and/or Systems Engineer is responsible for coordinating the entire project package including drawings and specifications.

13.2 Sheet Number Assignment

All drawings shall contain a unique sheet number as follows:

Cover sheet numbers shall be designated with a "T."
Mechanical drawing sheet numbers shall be designated with an "M."
Structural drawing sheet numbers shall be designated with an "S."
Process System drawing sheet numbers shall be designated with a "P."
Electrical & Controls drawing sheet numbers shall be designated with an "E."

13.3 Drawing Number Assignment

All drawings shall contain a unique drawing number. Completed drawings shall have a NASA drawing number for drawing file records. NASA drawing numbers will be assigned when the drawings are ready for final sign-off. Transportation between drawings shall be by sheet number.

13.4 Drawing Package Organization

The entire project drawing package shall be assembled as follows:

a. Cover Sheet
b. Drawing Index and General Notes
c. Mechanical drawings
d. Structural drawings
e. Process Systems drawings
f. Electrical & Controls drawings

13.5 Cover Sheet

The cover sheet shall include the project title and the NASA logo.

13.6 Drawing Index and General Notes

The drawing index and general notes sheet shall include a drawing index for all drawings in the project, legends, site location, and general notes pertaining to the entire project package.

14.0 AutoCAD Requirements

AutoCAD is the CAD system used by FSED and shall be used to document all mechanical drawings. The release number of AutoCAD used to generate the drawings shall be listed in the general notes on the first sheet of the mechanical drawing package (M1).

The AutoCAD requirements defined in this section are intended to provide people with limited AutoCAD experience the ability to open, edit, and plot a drawing.

14.1 Entities

Drawing generation shall be limited to the following type of entities: lines, arcs and circles, text, blocks, dimensions and polylines.

Part geometry definition shall be with single lines, circles and arcs. Polylines shall be used only when defining a contour or a part break-away.

Blocks may be generated with or without attributes. The standard blocks listed in Example 6 have been generated with attributes. A disk containing the standard blocks will be provided. During drawing generation, the draftsman may use as many blocks as needed, however, block names should be descriptive such that the part may be easily identified by the block name. The part name or commercial part number should be used as the block name.

Example:

The block name for a bracket detailed as item 3 on sheet M6 might be saved as a block "BRACKET_M6-3."

The block name for a Duff-Norton Actuator part number DM-9811 might be saved as a block "DUFF_NORTON_ACTUATOR_DM-9811."

All text shall be generated using the following text style definition via the "style" command :

Style name:	standard
Font file:	romans
Height:	0
Width factor:	1
Obliquing angle:	0
Backwards:	No
Upside-down:	No
Orientation:	Horizontal

All text shown in regular print shall be placed in the layer named "txt". All text shown in bold print shall be placed in the layer named "boldtxt".

14.2 Entity Properties

All entities shall have the following properties, unless otherwise noted:

Variable	Setting
CECOLOR	Bylayer
CELTYPE	Bylayer

The dimensioning variables listed below shall be set as follows:

Variable	Setting
DIMCLRD	Bylayer
DIMCLRE	Bylayer
DIMCLRT	Bylayer

14.3 Layers

Layer assignments for layers other than those listed in Table 1 shall be listed on the "README" layer of the AutoCAD file. Layer descriptions must adequately describe the entities in each layer.

The following layers shall be used as a minimum:

Table 1

Layer Name	Color	Line Type	Description
BORDER	3 (Green)	Continuous	Border (w/Logo)
CEN	1 (Red)	Center	Centerlines
DIM	2 (Yellow)	Continuous	Dimensions (Dimension lines, Extension Lines, Arrows & Text); Leader Lines; Leader Lines with Text; Weld Symbols
HATCH	9	Continuous	Crosshatching
HID	3 (Green)	Hidden	Hidden Lines
OBJ	4 (Cyan)	Continuous	Object Lines
PHAN	8	Phantom	Phantom Lines
TXT	2 (Yellow)	Continuous	Parts List Table; Standard Blocks; Text
BOLDTXT	6 (Magenta)	Continuous	Bold Text; Cutting Plane Lines & Arrows
README	7 (White)	Continuous	Readme information
HDWR	5 (Blue)	Continuous	Bolts; Nuts; Commercial items
VP	7 (White)	Continuous	Viewport lines in paper space

If necessary, assembly drawings may contain additional layers named by part name. Identifying the object lines of parts on separate layers of an assembly will be helpful when editing adjacent parts in assemblies. Additional layers for object lines shall conform to the colors and line types listed in Table 2. Layer assignments for additional layers shall be listed on the "README" layer of the AutoCAD file.

Example: A part called a pump mount might include the following layers:

pump_mt-obj
pump_mt-objo
pump_mt-hidden
pump_mt-hardware
pump_mt-left-bracket
pump_mt-baseplate

Table 2	
Color	Line Type
7 (White)	Continuous
11	Continuous
13	Continuous

14.4 README Layer

A layer named README shall be added to each drawing file. The information on the README layer shall be placed at drawing coordinates X=0, Y= -1. The status of the README layer shall be "FROZEN" when the drawing has been completed. The README layer shall include the following information:

Brief (1-2 line) description of drawing
List and description of drawing layers for layers other than those listed in Table 1
Information about plotting the drawing (i.e. scale factor required)
Information regarding construction of the drawing
- x-refs if used
- dim styles if used
- viewports in paper space if used

14.5 File Names for AutoCAD Drawings

AutoCAD drawing files shall be identified by drawing number.

14.6 Revisions to AutoCAD Drawings

When a revision is made to a drawing, the electronic file shall be saved as a new file. The file name for the revised drawing shall be the drawing number with the appropriate revision letter.

Example:

File Name:	548621	(Original Drawing)
File Name:	548621A	(Revision A)

The approval signatures and dates on the original drawing shall be replaced with the typed name of the original approver and the typed date. Original signatures and dates shall appear on the latest revision in the revision block.

14.7 Plotting Configuration

For a particular plotter, each pen number is associated with a line weight or thickness. In the plotting configuration, pen assignments for each color shall be in accordance with the following line weights and the attached FSED Line Weight/Color Standard:

Color	Line Weight
8	.25 mm
9	.25 mm
1 (Red)	.35 mm
2 (Yellow)	.35 mm
3 (Green)	.35 mm
5 (Blue)	.35 mm
4 (Cyan)	.50 mm
7 (White)	.50 mm
11	.50 mm
13	.50 mm
6 (Magenta)	.70 mm

Line Weight/Color Charts (A7)

Versatec 8836 LASER PLOTTER (HP-GL 7585)

	0.25mm pen#5 (04 width)	0.35mm pen#3 (05 width)	0.50mm pen#6 (07 width)	0.70mm pen#7 (10 width)	1.00mm pen#8 (15 width)
COLOR	#8 #9 #15	#1(RED) #2(YELLOW) #3(GREEN) #5(BLUE)	#4(CYAN) #7(WHITE) #11 #13	#6(MAGENTA) #10 #12	#14

Versatec 8510 TURBO CADMATE (400 DPI)

	0.25mm pen# 1	0.35mm pen# 2	0.50mm pen# 3	0.70mm pen# 4	1.00mm pen# 5
COLOR	#8 #9 #15	#1(RED) #2(YELLOW) #3(GREEN) #5(BLUE)	#4(CYAN) #7(WHITE) #11 #13	#6(MAGENTA) #10 #12	#14

QMS860P PRINTER / PLOTTER (CEAT)

	0.25mm pen# 1 (.005)	0.35mm pen# 2 (.007)	0.50mm pen# 3 (.010)	0.70mm pen# 4 (.014)	1.00mm pen# 5 (.020)
COLOR	#8 #9 #15	#1(RED) #2(YELLOW) #3(GREEN) #5(BLUE)	#4(CYAN) #7(WHITE) #11 #13	#6(MAGENTA) #10 #12	#14

COMPAQ PRINTER / PLOTTER (EESB)

	0.25mm pen# 1 (.005)	0.35mm pen# 2 (.007)	0.50mm pen# 3 (.010)	0.70mm pen# 4 (.014)	1.00mm pen# 5 (.020)
COLOR	#8 #9 #15	#1(RED) #2(YELLOW) #3(GREEN) #5(BLUE)	#4(CYAN) #7(WHITE) #11 #13	#6(MAGENTA) #10 #12	#14

HPIII SI POSTSCRIPT- NOVELL PRINTER/PLOTTER (MET)

	0.25mm pen# 1 (.005)	0.35mm pen# 2 (.007)	0.50mm pen# 3 (.010)	0.70mm pen# 4 (.014)	1.00mm pen# 5 (.020)
COLOR	#8 #9 #15	#1(RED) #2(YELLOW) #3(GREEN) #5(BLUE)	#4(CYAN) #7(WHITE) #11 #13	#6(MAGENTA) #10 #12	#14

LWPRO 810 PRINTER / PLOTTER (MET)

	0.25mm pen# 1 (.005)	0.35mm pen# 2 (.007)	0.50mm pen# 3 (.010)	0.70mm pen# 4 (.014)	1.00mm pen# 5 (.020)
COLOR	#8 #9 #15	#1(RED) #2(YELLOW) #3(GREEN) #5(BLUE)	#4(CYAN) #7(WHITE) #11 #13	#6(MAGENTA) #10 #12	#14

FSED LINE WEIGHT/COLOR STANDARD FOR DIVISION RESOURCES (A1)

WEIGHT	COLOR #	CIVIL	ARCHITECTURAL	HVAC	STRUCTURAL	MACHINE DESIGN	PROCESS SYS.	ELECTRICAL	AUTOMATION
.25MM	#8 #9 #15	EXST. COND. HATCH PATTERN	HATCH PATTERN	BLDG. BKGRND EXST. PIPING EXST. DUCT EXST. EQUIP. NEW FLEX DUCT	EXST. COND. HATCH PATTERN	HATCH PATTERN PHANTOM LINE	EXST. STRUCT.	EXST. BLDG.	EXST. AUTOMATION
.35MM	#1(RED) #2(YELLOW) #3(GREEN) #5(BLUE)	TEXT DIMENSION COLUMN GRID CENTER LINE HIDDEN LINE	TEXT DIMENSION EXST. CONST. CENTER LINE HIDDEN LINE	TEXT DIMENSIONS DIFFUSERS PIPE FITTINGS	TEXT DIMENSION COLUMN GRID CENTER LINE HIDDEN LINE	TEXT DIMENSION EXT. LINE LEADER LINE HIDDEN LINE CENTER LINE PUR. HARDWARE BORDER	TEXT DIMENSIONS NEW STRUCT. EXST. STRUCT	TEXT DIMENSIONS EXST. E. E. WK.	TEXT EXST. AUTOMATION
.50MM	#4(CYAN) #7(WHITE) #11 #13	NEW CONCRETE NEW STEEL NEW COLUMNS CIVIL DETAILS	OBJECT LINE NEW WORK HIDDEN LINE	NEW EQUIPMENT NEW DUCT NEW PIPING SCH. BORDER	NEW CONCRETE NEW STEEL NEW COLUMNS CIVIL DETAILS	OBJECT LINE	EXST. PIPING EXST. EQUIPMENT		
.70MM	#12 #10 #6(MAGENTA)	GFE	SECT. OUTLINE	SANITARY PIPING VENT PIPING DEMOLITION	GFE	CUT PLANE LINE BOLD TEXT	NEW PIPING NEW EQUIPMENT	NEW E. E. WORK	NEW AUTOMATION
1.0MM	#14		SPEC. BOLD LINE						

REVISIONS

SYM	ZONE	REV	DESCRIPTION
11/28/92	A	2	UPDATED TO CORRECT MACHINE DESIGN INFO & PLOTTER/PRINTER INFORMATION

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C. A. [illegible] 12/11/91

FSED LINE WEIGHT & COLOR STANDARDS

SIZE D — REV A

15.0 Drafting Standard Examples

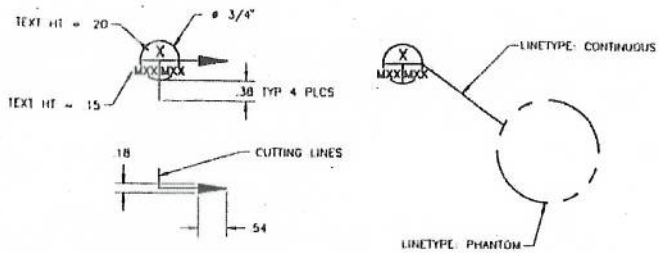
ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

REGULAR PRINT, LAYER: TXT
BOLD PRINT, LAYER: BOLDTXT

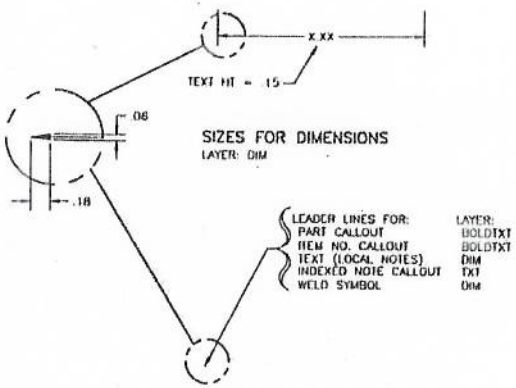
TEXT HEIGHT = 10
TEXT HEIGHT = 15
TEXT HEIGHT = 20
TEXT HEIGHT = .25

TEXT HEIGHT = .75

TEXT SIZES
FONT FILE: ROMANS

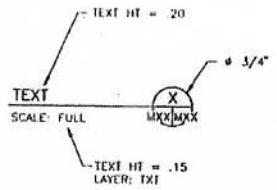


SIZES FOR SECTIONS AND VIEWS TAKEN
LAYER: BOLDTXT

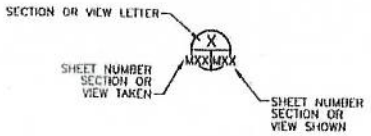


SIZES FOR DIMENSIONS
LAYER: DIM

SIZES FOR LEADER LINES
LAYER: DIM UNLESS OTHERWISE NOTED



SIZES FOR SECTIONS AND VIEWS SHOWN
LAYER: BOLDTXT, UNLESS OTHERWISE NOTED



LEGEND

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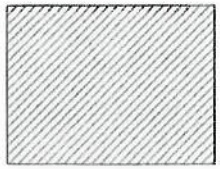
MECHANICAL DRAFTING STANDARDS

EXAMPLE NO 1 - TEXT HEIGHT
DIMENSION, SECTION & VIEW CALLOUTS

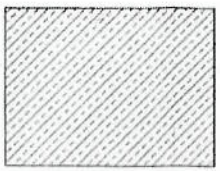
SIZE D

DRAWING NO. XXXXXX

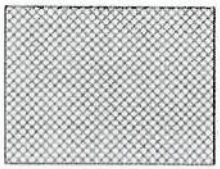


FOR: CAST IRON OR GENERAL USE
AUTOCAD NAME: ANSI31

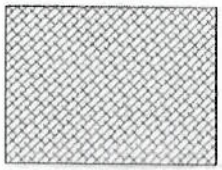
FOR: STEEL
AUTOCAD NAME: ANSI32 OR STEEL



FOR: BRONZE, BRASS, COPPER AND COMPOSITIONS
AUTOCAD NAME: ANSI33 OR BRASS



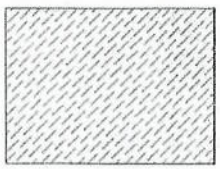
FOR: ZINC, LEAD, MAGNESIUM AND ALLOYS
AUTOCAD NAME: ANSI37



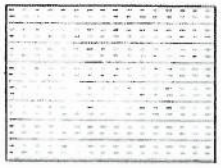
FOR: ALUMINUM AND ALLOYS
AUTOCAD NAME: ANSI38

FOR: RUBBER AND PLASTIC
AUTOCAD NAME: ANSI34

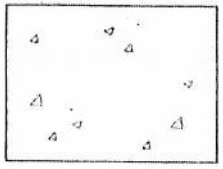
FOR: REFRACTORY MATERIAL
AUTOCAD NAME: ANSI35



FOR: GLASS, PORCELAIN, ETC.
AUTOCAD NAME: ANSI36



FOR: INSULATION
AUTOCAD NAME: INSUL



FOR: CONCRETE
AUTOCAD NAME: ARCONC

STANDARD HATCH PATTERNS

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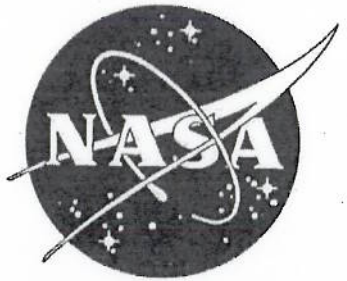
PROJECT TITLE: MECHANICAL DRAFTING STANDARDS

EXAMPLE NO 2
STANDARD HATCH PATTERNS

SIZE: D
DRAWING NO.: XXXXXX

PROJECT TITLE LINE NO 1
PROJECT TITLE LINE NO 2



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ZONE	DESCRIPTION	BY	CHECKED	APPD

APPROVALS

	DESCRIPTION	DATE

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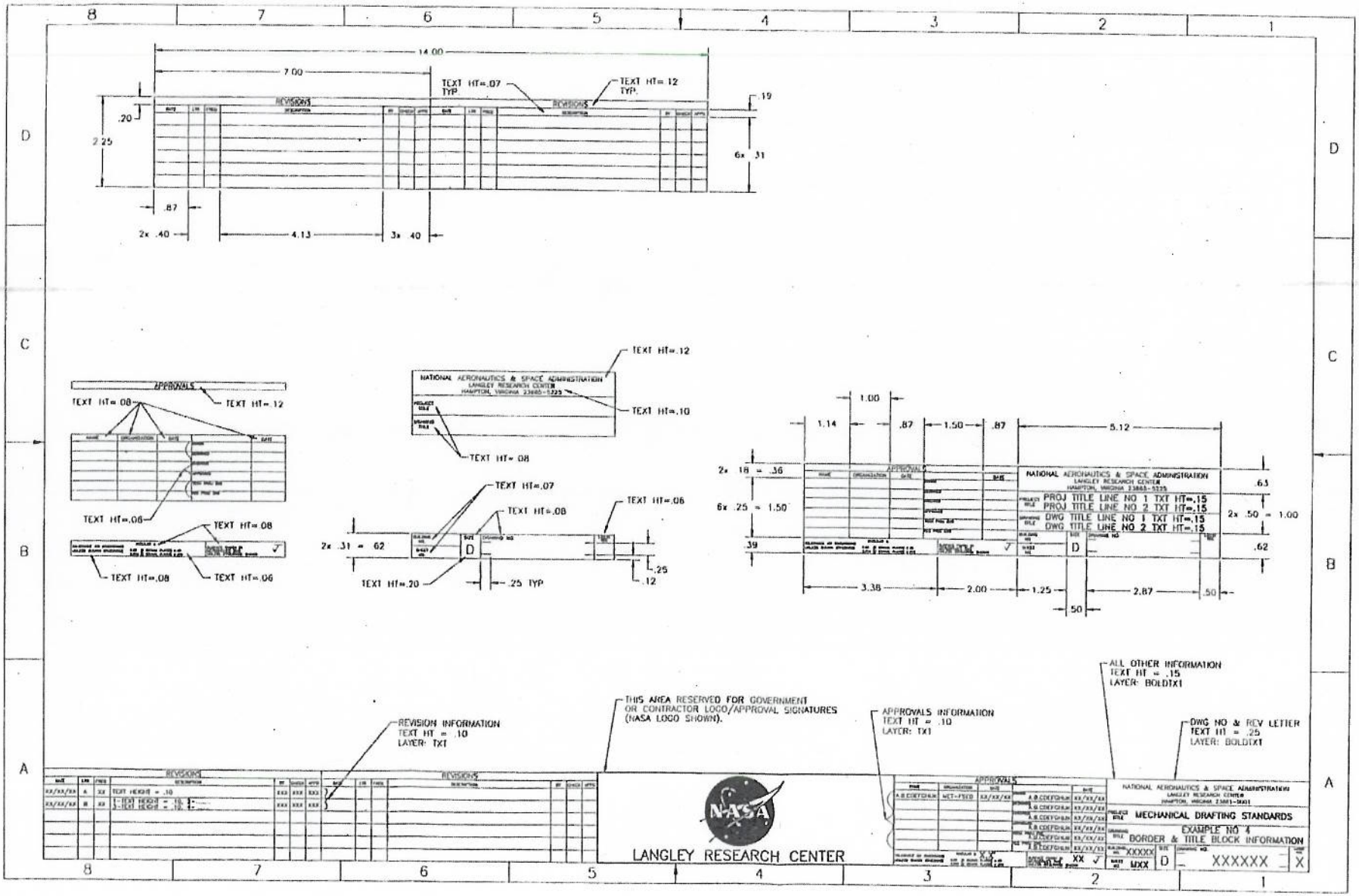
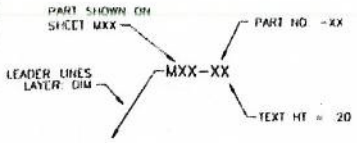
MECHANICAL DRAFTING STANDARDS

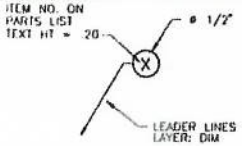
EXAMPLE NO 3
COVER SHEET

SIZE D — XXXXXX

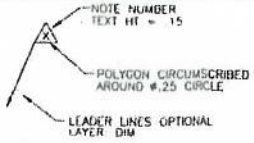

14.00
7.00
TEXT HT=.07 TYP
TEXT HT=.12 TYP.
REVISIONS
.20
2.25
.19
6x .31
.87
2x .40
4.13
3x .40
APPROVALS
TEXT HT=.08
TEXT HT=.12
TEXT HT=.06
TEXT HT=.08
TEXT HT=.08
TEXT HT=.06
NATIONAL AERONAUTICS & SPACE ADMINISTRATION
LANGLEY RESEARCH CENTER
HAMPTON, VIRGINIA 23665-5225
TEXT HT=.12
TEXT HT=.10
TEXT HT=.08
TEXT HT=.07
TEXT HT=.08
TEXT HT=.06
2x .31 = .62
TEXT HT=.20
.25 TYP
.25
.12
1.00
1.14
.87
1.50
.87
5.12
2x .18 = .36
6x .25 = 1.50
.39
.63
2x .50 = 1.00
.62
PROJ TITLE LINE NO 1 TXT HT=.15
PROJ TITLE LINE NO 2 TXT HT=.15
DWG TITLE LINE NO 1 TXT HT=.15
DWG TITLE LINE NO 2 TXT HT=.15
3.38
2.00
1.25
2.87
.50
.50
ALL OTHER INFORMATION
TEXT HT = .15
LAYER: BOLDTXT
REVISION INFORMATION
TEXT HT = .10
LAYER: TXT
THIS AREA RESERVED FOR GOVERNMENT
OR CONTRACTOR LOGO/APPROVAL SIGNATURES
(NASA LOGO SHOWN).
APPROVALS INFORMATION
TEXT HT = .10
LAYER: TXT
DWG NO & REV LETTER
TEXT HT = .25
LAYER: BOLDTXT
TEXT HEIGHT = .10
LANGLEY RESEARCH CENTER
MECHANICAL DRAFTING STANDARDS
EXAMPLE NO 4
BORDER & TITLE BLOCK INFORMATION
XXXXX
XXXXXX
D
X



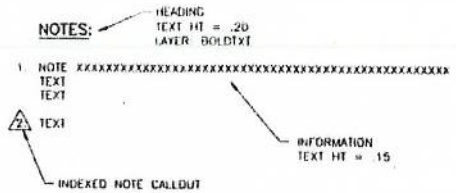
PART CALLOUT
LAYER: BOLDTXT, UNLESS OTHERWISE NOTED



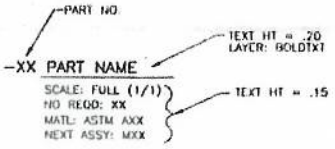
ITEM NO. CALLOUT
LAYER: BOLDTXT, UNLESS OTHERWISE NOTED



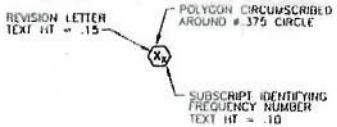
SIZES FOR INDEXED NOTE CALLOUT
LAYER: TXT, UNLESS OTHERWISE NOTED



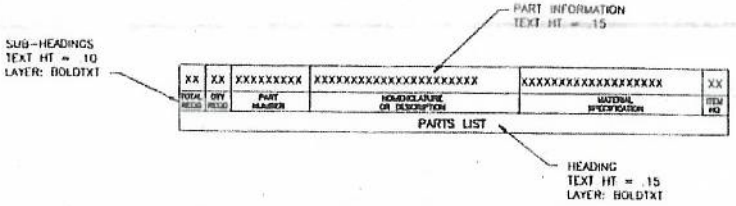
SIZES FOR NOTES
LAYER: TXT, UNLESS OTHERWISE NOTED



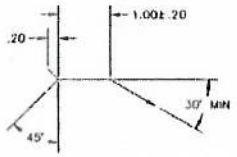
DETAILED PART INFORMATION
LAYER: TXT, UNLESS OTHERWISE NOTED
() OPTIONAL



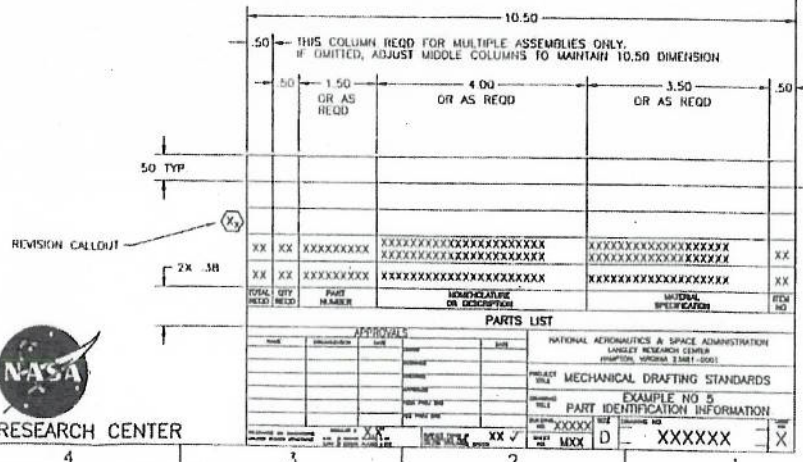
REVISION CALLOUT
LAYER: BOLDTXT



SIZES FOR PARTS LIST
LAYER: TXT, UNLESS OTHERWISE NOTED



WELDING SYMBOL CALLOUT
LAYER: DIM



REVISIONS

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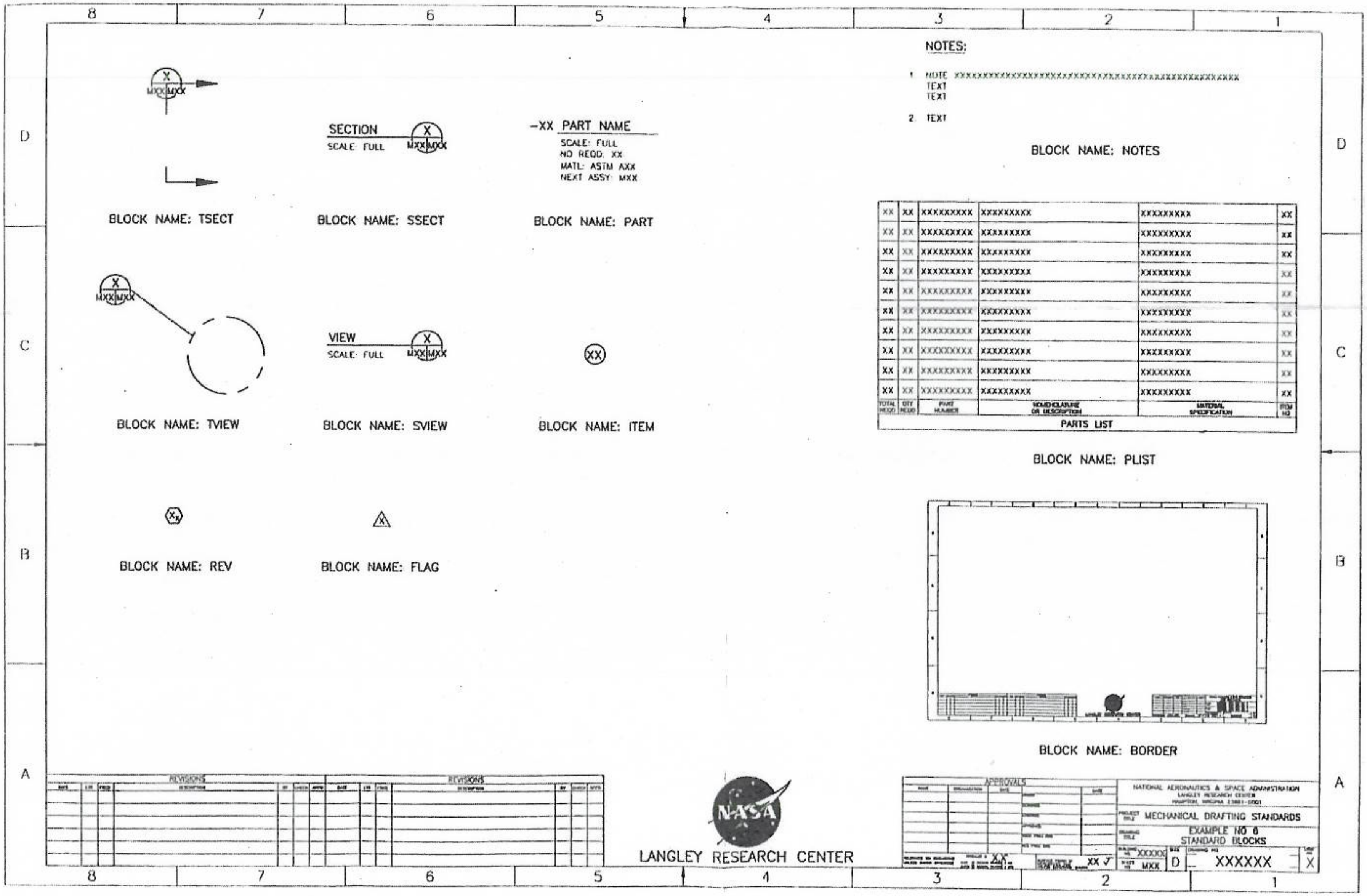
NOTES:
1 NOTE XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
TEXT
TEXT
2 TEXT
BLOCK NAME: NOTES
SECTION
SCALE: FULL
-XX PART NAME
SCALE: FULL
NO REQD: XX
MATL: ASTM AXX
NEXT ASSY: MXX
BLOCK NAME: TSECT
BLOCK NAME: SSECT
BLOCK NAME: PART
PARTS LIST
BLOCK NAME: TVIEW
VIEW
SCALE: FULL
BLOCK NAME: SVIEW
BLOCK NAME: ITEM
BLOCK NAME: PLIST
BLOCK NAME: REV
BLOCK NAME: FLAG
BLOCK NAME: BORDER
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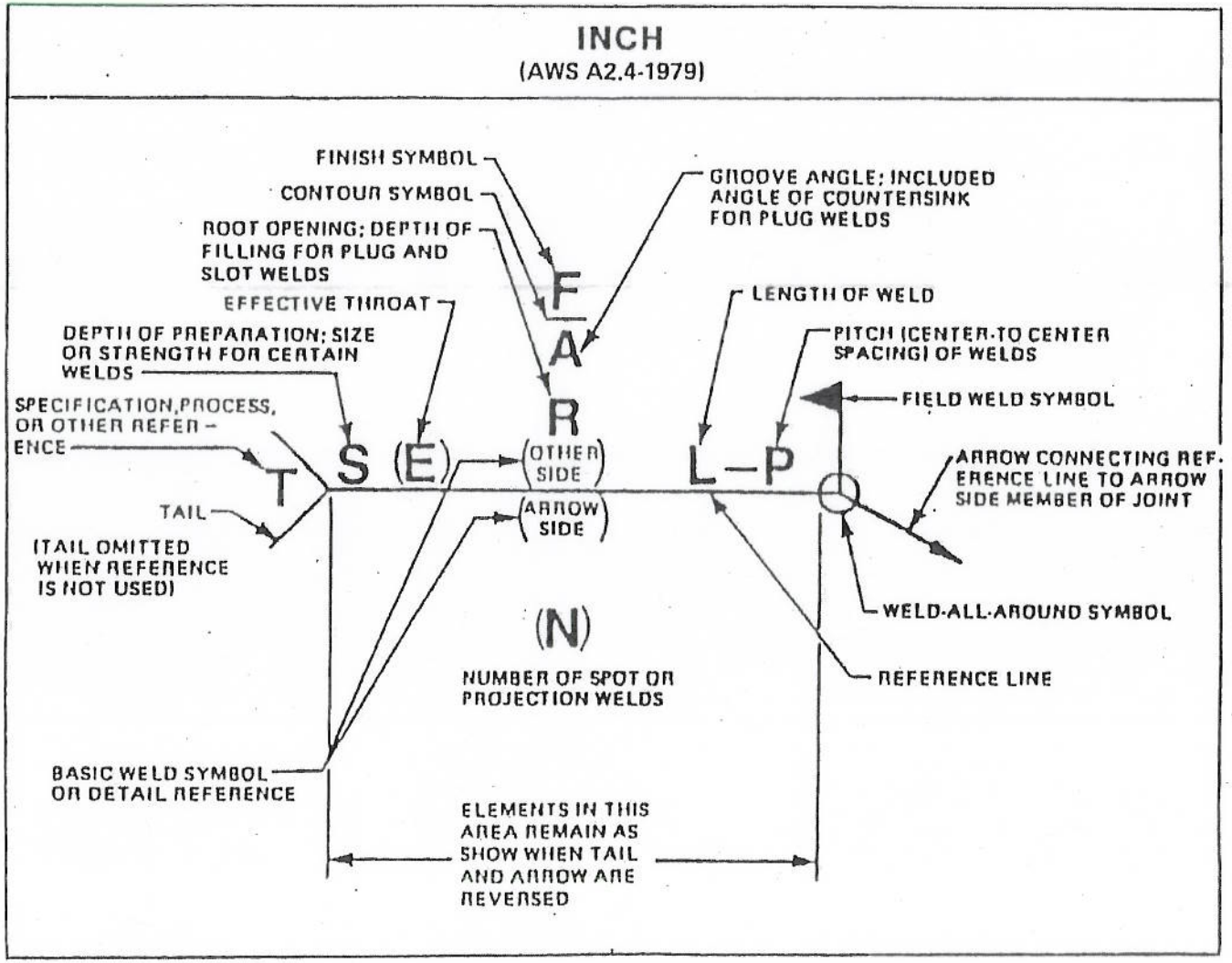
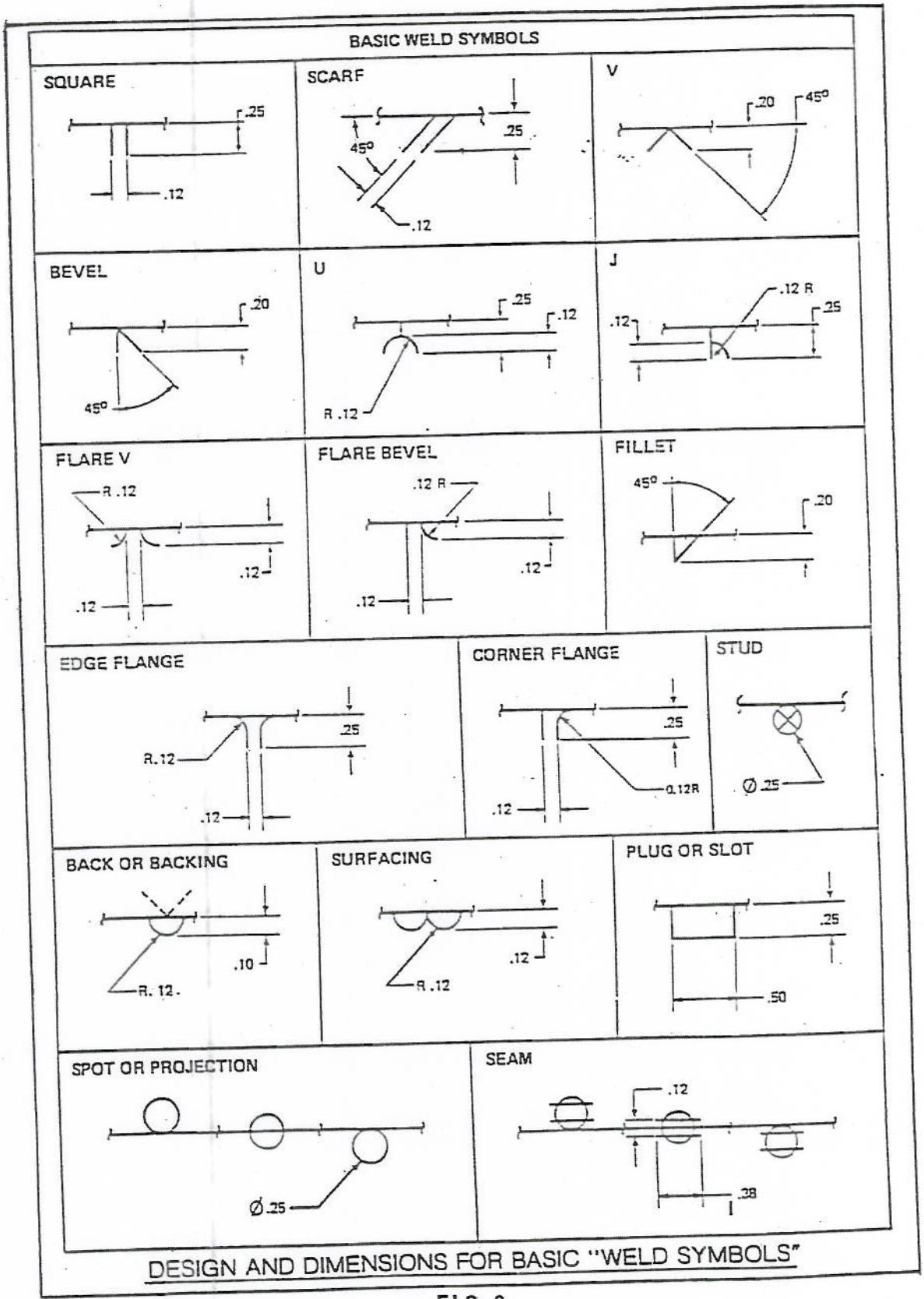
MECHANICAL DRAFTING STANDARDS
EXAMPLE NO 6
STANDARD BLOCKS
XXXXXX

16.0 Figures



STANDARD LOCATION OF ELEMENTS OF A WELDING SYMBOL

FIG. 1



DESIGN AND DIMENSIONS FOR BASIC "WELD SYMBOLS"

FIG. 2

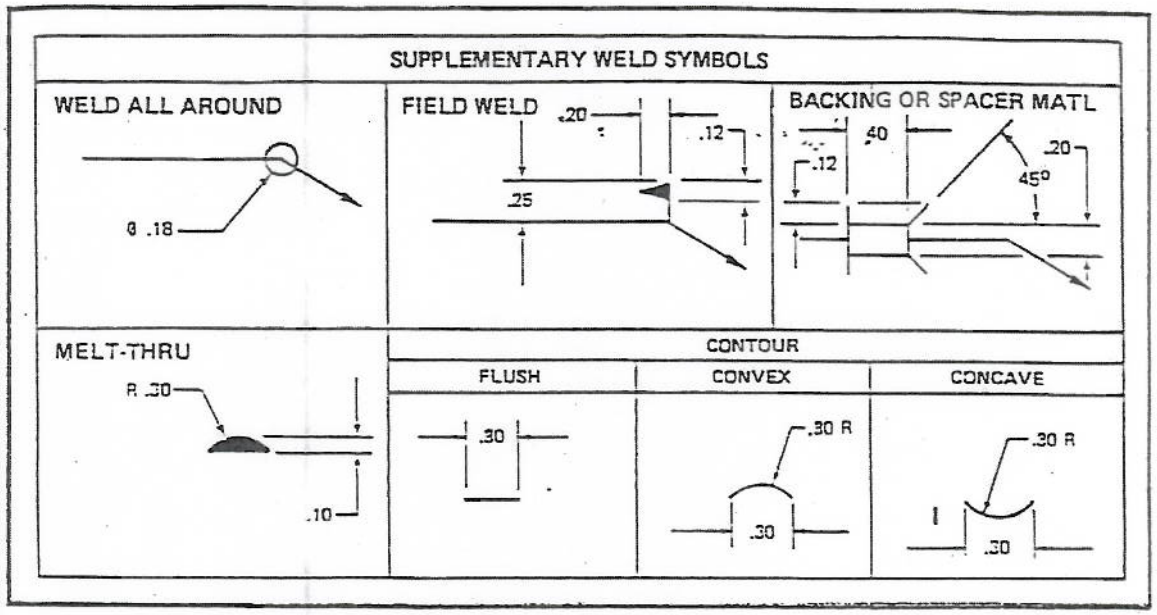
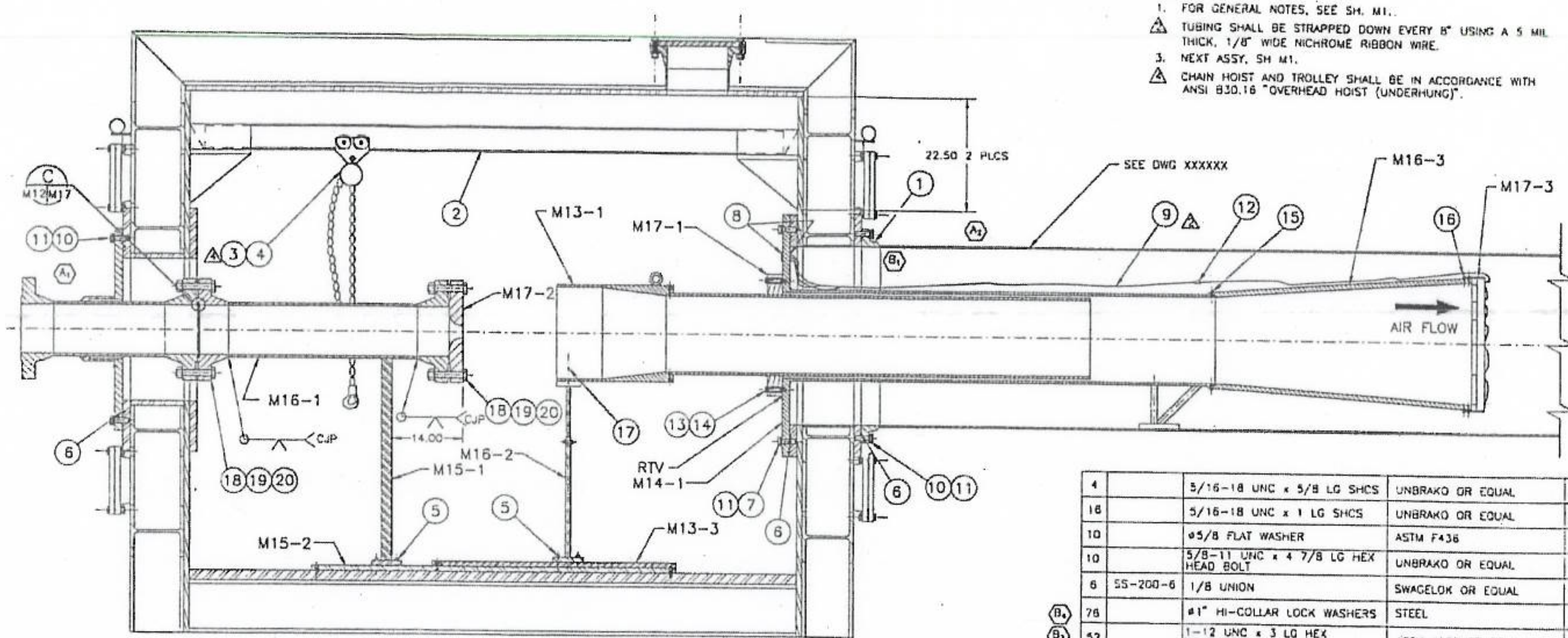

SUPPLEMENTARY WELD SYMBOLS
WELD ALL AROUND
⌀ .18
FIELD WELD
.20
.12
.25
BACKING OR SPACER MATL
.40
.12
.20
45°
MELT-THRU
R .30
.10
CONTOUR
FLUSH
CONVEX
CONCAVE
.30
.30 R
.30
.30 R
.30

FIG. 3

17.0 Sample Drawings

NOTES:
1. FOR GENERAL NOTES, SEE SH. M1.
2. (△) TUBING SHALL BE STRAPPED DOWN EVERY 8" USING A 5 MIL THICK, 1/8" WIDE NICHROME RIBBON WIRE.
3. NEXT ASSY. SH M1.
4. (△) CHAIN HOIST AND TROLLEY SHALL BE IN ACCORDANCE WITH ANSI B30.16 "OVERHEAD HOIST (UNDERHUNG)".



SECTION A
SCALE: 1/8 M1 M12

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QTY REQD	PART NUMBER	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	ITEM NO
32		#1 1/4 HARDENED FLAT WASHER	ASTM F436	20
32		1 1/4-7 UNC HEX NUT	ASTM A194 GR 2H	19
32		1 1/4-7 UNC x 7 LG HEX HEAD BOLT	ASTM A193 GR B7	18
3		1/4-20 UNC x 7/8 LG FLAT HEAD SCREW	ASTM A193 GR B7	17

PARTS LIST

	QTY REQD	PART NUMBER	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	ITEM NO
	4		5/16-18 UNC x 5/8 LG SHCS	UNBRAKO OR EQUAL	16
	16		5/16-18 UNC x 1 LG SHCS	UNBRAKO OR EQUAL	15
	10		ø5/8 FLAT WASHER	ASTM F436	14
	10		5/8-11 UNC x 4 7/8 LG HEX HEAD BOLT	UNBRAKO OR EQUAL	13
	6	SS-200-6	1/8 UNION	SWAGELOK OR EQUAL	12
B4	76		ø1" HI-COLLAR LOCK WASHERS	STEEL	11
B3	52		1-12 UNC x 3 LG HEX HEAD BOLT	ASTM A193 GR B7	10
	AR		1/8 OD x .018 WALL TUBE	347 SS	9
	12	SS-200-1-2	1/8" MALE CONNECTOR	SWAGELOK OR EQUAL	8
	24		1-12 UNC x 3 LG HEX HEAD BOLT	ASTM A193 GR B7	7
	AR		ø1/4 NOM O-RING	VITON	6
	8		1/2-13 UNC X 1 3/4 LG SHCS	UNBRAKO OR EQUAL	5
△	1	#622	HAND CHAIN HOIST	CM OR EQUAL	4
△	1	#3924	PLAIN ROLLER BEARING TROLLEY	CM OR EQUAL	3
	1		S5x10 x 9'-6" LG BEAM	ASTM A36	2
B2	1		ø36" 150# WNF FLANGE	ASTM A105	1

REVISIONS

APPROVALS

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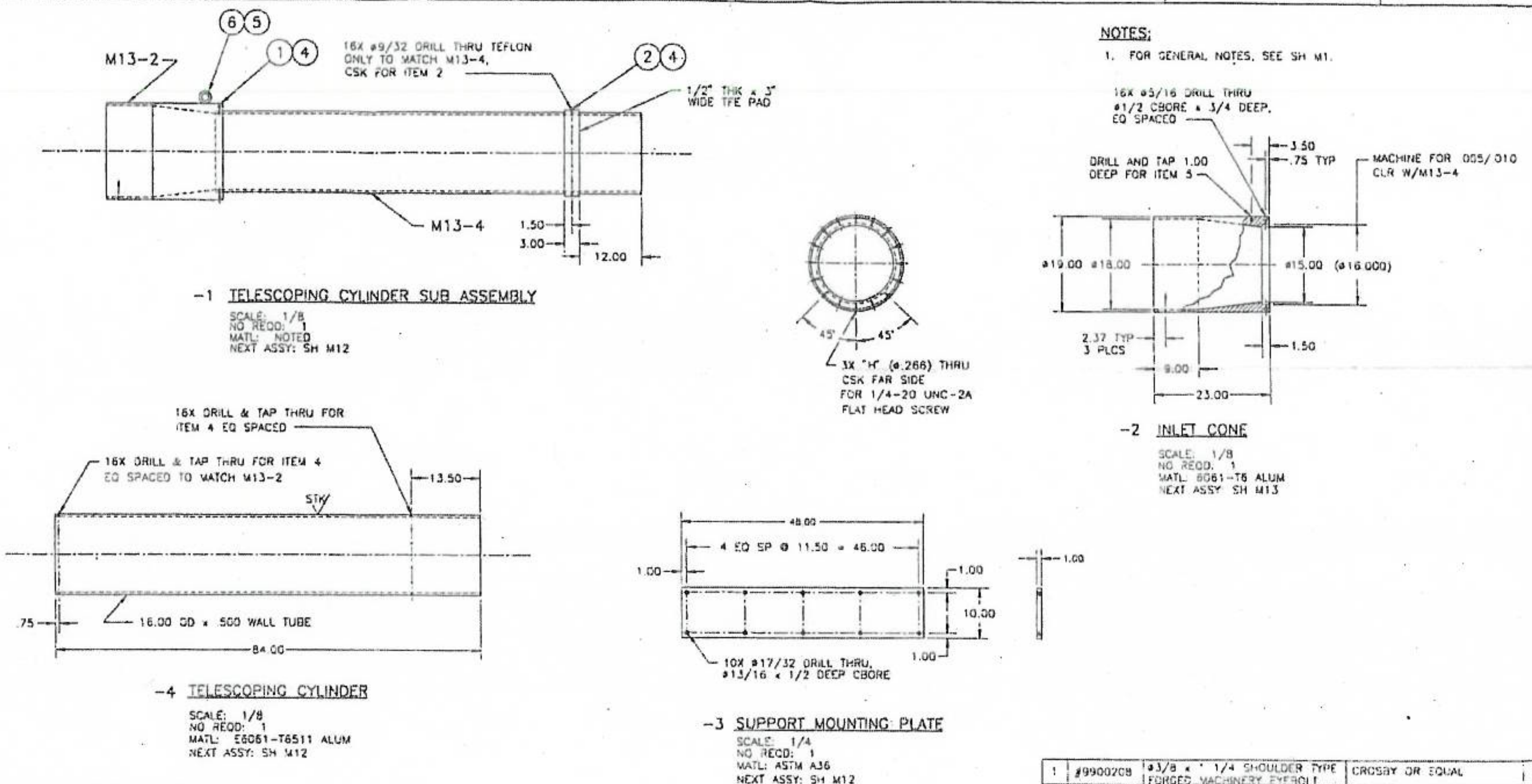
LANGLEY RESEARCH CENTER

PROJECT TITLE: MECHANICAL DRAFTING STANDARDS

DRAWING TITLE: SAMPLE DRAWING 1 - ASSEMBLY

SHEET NO M12 | SIZE D | DRAWING NO XXXXXX | B



THIS SAMPLE DRAWING IS INFORMATIONAL ONLY AND COMPLETE TO THE DEGREE NECESSARY TO ILLUSTRATE THE INFORMATION BEING DESCRIBED

QTY REQD	PART NUMBER	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	ITEM NO
1	#9900208	ø3/8 x 1 1/4 SHOULDER TYPE FORGED MACHINERY EYEBOLT	CROSBY OR EQUAL	6
1		3/8-16 UNC x 2.50 SELF LOCKING THREAD INSERT	HELICOIL OR EQUAL	5
32		1/4-20 UNC x 1.50 SELF LOCKING THREAD INSERT	HELICOIL OR EQUAL	4
		NOT USED		3
16		1/4-20 UNC x 3/4 LG FLAT HEAD SCREW	UNBRAKO OR EQUAL	2
16		1/4-20 UNC x 1 1/4 LG SHCS	UNBRAKO OR EQUAL	1

PARTS LIST

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MECHANICAL DRAFTING STANDARDS

SAMPLE DRAWING 2
SUBASSEMBLY & DETAILS

M13

XXXXXX

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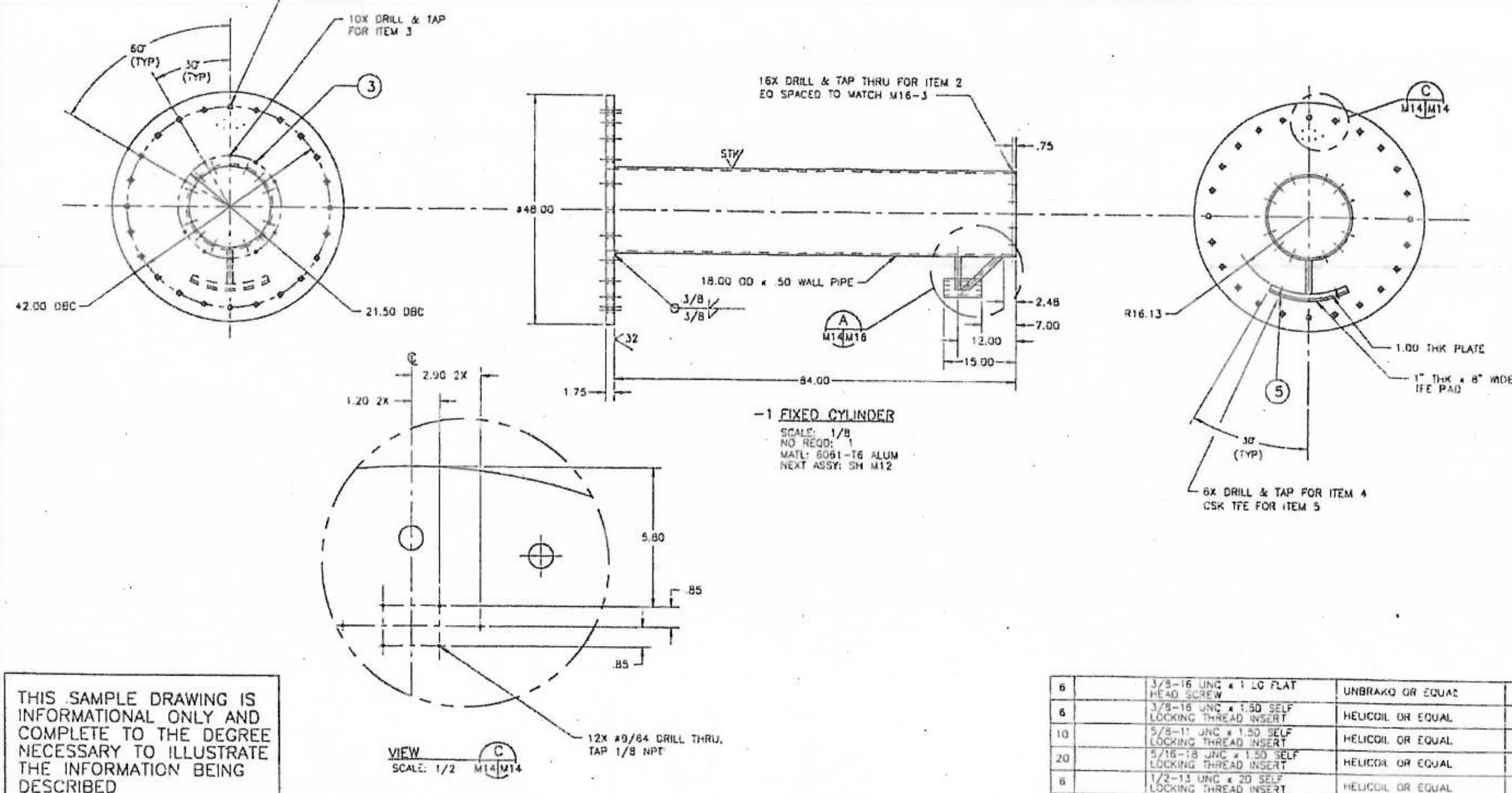
NOTES:

1. SEE SH M1 FOR GENERAL NOTES



THIS SAMPLE DRAWING IS INFORMATIONAL ONLY AND COMPLETE TO THE DEGREE NECESSARY TO ILLUSTRATE THE INFORMATION BEING DESCRIBED

QTY REQD	PART NUMBER	NOMENCLATURE OR DESCRIPTION	MATERIAL SPECIFICATION	ITEM NO
6		3/8-16 UNC x 1 LG FLAT HEAD SCREW	UNBRAKO OR EQUAL	5
6		3/8-16 UNC x 1.50 SELF LOCKING THREAD INSERT	HELICOIL OR EQUAL	4
10		5/8-11 UNC x 1.50 SELF LOCKING THREAD INSERT	HELICOIL OR EQUAL	3
20		5/16-18 UNC x 1.50 SELF LOCKING THREAD INSERT	HELICOIL OR EQUAL	2
6		1/2-13 UNC x 20 SELF LOCKING THREAD INSERT	HELICOIL OR EQUAL	1

PARTS LIST

REVISIONS					
7/8/95	A		ADDED LEADER NOTE		

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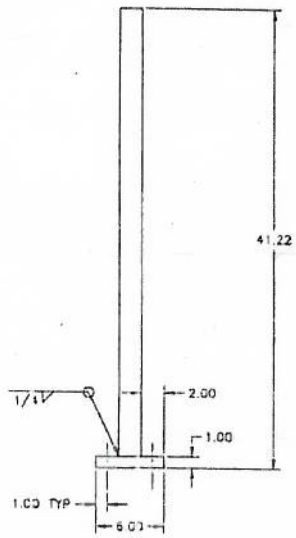
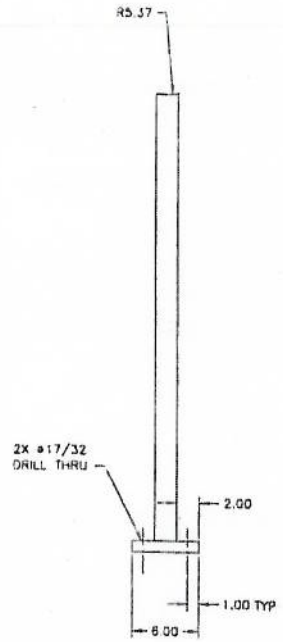
PROJECT TITLE: MECHANICAL DRAFTING STANDARDS

DRAWING TITLE: SAMPLE DRAWING 3 - WELDMENT

SHEET M14 | SIZE D | DRAWING NO XXXXXX | A





-1 VERTICAL SUPPORT

SCALE: 1/4
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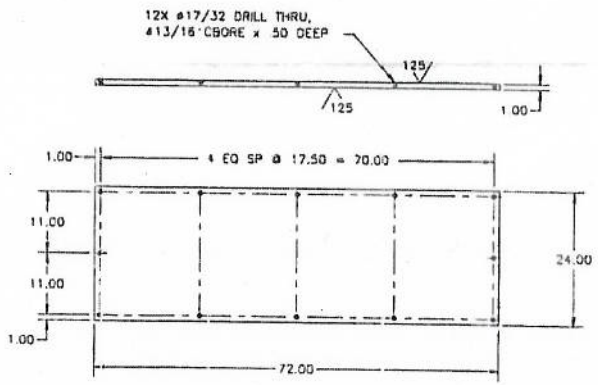
MATL: ASTM A36
NEXT ASSY: SH M12



-2 NOZZLE/MODEL MOUNTING PLATE

SCALE: 1/8
NO REQD: 3
MATL: ASTM A36
NEXT ASSY: SH M12

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NATIONAL AERONAUTICS & SPACE ADMINISTRATION LANGLEY RESEARCH CENTER HAMPTON, VIRGINIA 23681-0001	
PROJECT TITLE	MECHANICAL DRAFTING STANDARDS
DRAWING TITLE	SAMPLE DRAWING 4 – DETAILS
SIZE	D
DRAWING NO	XXXXXX
SHEET NO	M151

EXHIBIT N

NASA
Langley Research Center (LaRC)

Systems Engineering Competency

Construction Management Manual

November 29, 2000

TABLE of CONTENTS

CONSTRUCTION MANAGEMENT MANUAL

TABLE of CONTENTS, continued

SECTION (1) INTRODUCTION
DIRECTORY

FOREWORD

The NASA LaRC Construction Management Manual (LCMM) is a handbook compiled by the Systems Engineering Competency (SEC), Langley Research Center, Hampton, VA as a guide to technicians, engineers and engineering management for the construction phase of facility acquisition projects.

The manual presents SEC's policies for construction management and provides specific procedures for use at Langley. It is Langley's detailed implementation of the broader policies concerning construction found in the NASA Facility Project Implementation Handbook (FPIH). Those not familiar with NASA's general policies regarding the construction of facility acquisition projects should refer to the FPIH for a broad overview of the process.

This document is primarily directed toward Project Manager (PM), Contracting Officer's Technical Representatives (COTR) and Construction Managers (CM). Nonetheless, personnel in Office of Procurement (OP), facility systems support personnel, Office of Safety and Mission Assurance, (OSMA), and Office of Security and Environmental Management (OSEM) and other organizations will find it useful for their involvement in facility acquisition projects.

CONSTRUCTION MANAGEMENT DEFINED

The term Construction Management (CM) means different things to different people depending upon one's background in the construction industry. Notwithstanding such variance in interpretation, within SEC the term has generally come to mean the construction contract oversight provided by the PM or the COTR in conjunction with a support staff during the construction phase of a project. It includes, among other things: reviewing and approving/disapproving submittals, issuing requests to the contractor for change proposals, change order estimating and replying to requests for information. On most projects it also includes a fair amount of discussion with the construction contractor as to just what the plans and specifications require.

As used in this manual, CM also includes: (1) pre-construction activities such as acquisition planning (2) the management of Government furnished materials; (3) the formation of the project construction management team, (4) post-construction activities such as shakedown, commissioning and turn over, as-built drawings, and (5) project evaluation.

As used herein, CM is not the effort of a single individual—it's a team effort. CM is a collection of tasks performed by individuals on the project construction management team.

The term Construction Manager is used for a particular, designated individual. The Construction Manager performs an overall coordinative/management role during the construction phase—a role often separate from that of the PM or the COTR. For some construction projects a single person may be assigned all three roles—PM, COTR and Construction Manager; and for most projects, when the Construction Manager is a Government employee, he is also delegated COTR responsibilities.

Construction management oversight for Langley is provided within SEC through NASA Civil Service and contract personnel. Construction Managers are typically assigned or contracted from the Engineering Support and Facilities Projects Branch (ESFPB) and are tasked with the overall facilitation, coordination, and standardization of SEC's project support during the construction phase.

The interrelationship between the Construction Manager, COTR, SEC technical branches and offices, other NASA LaRC organizations and the general contractor is illustrated below in Figure (1). The interrelationships, shown diagrammatically in this figure, are developed in more detail throughout this manual.

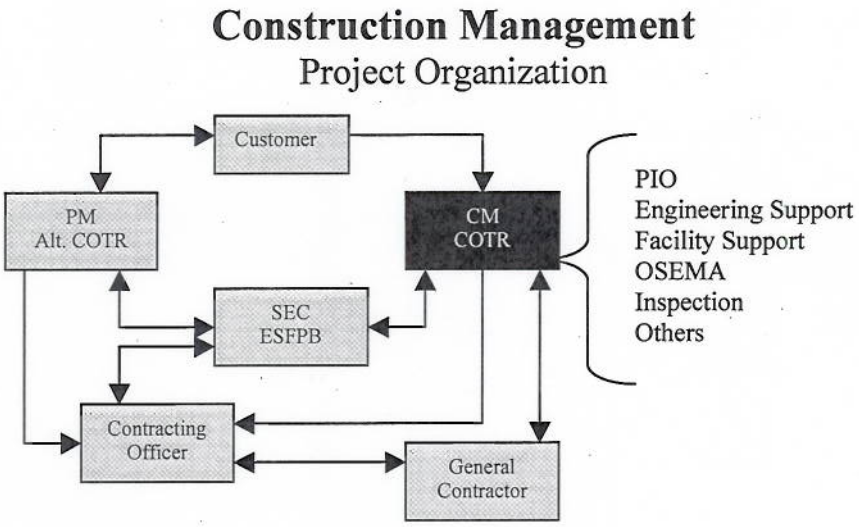

Figure (1):
SEC Construction Management Project Organization

The construction management approach developed in this manual is a flexible one that accommodates construction management activities performed by NASA personnel, support service contractors or A/E contractor personnel. It does this by differentiating between inherently governmental activities and non-governmental activities and by providing procedures under which each activity is performed.

Most construction management activities are not inherently governmental so there is a fair amount of latitude when determining how specific activities will be performed. The options for setting up a project construction management team and the process of assigning various construction management activities is described in detail in later sections of this manual.

The ROLE of The PM

One cannot adequately discuss construction management within the context of NASA's facility acquisition programs without addressing the role of the Project Manager (PM). The PM has "cradle to grave" responsibility for a facility or system project. Throughout the project life cycle, beginning with the concept through detail design, construction and commissioning, the PM is the primary point of contact between SEC's customer and the project team. The PM is tasked to provide a facility that fully satisfies the needs of the customer within the constraints of the project budget.

Typically, the PM is delegated responsibility at the project's inception. Thereafter, he or she coordinates all Langley activities in support of the project during planning, design and construction.

PM responsibilities include design oversight, construction management and commissioning, including the orderly and effective transition from construction to an operational status. Although the PM maintains a project management role through the construction phase, day to day construction management activities may be assigned to others. By organizing a project team with construction management capability, the majority of issues that arise during construction, along with a substantial amount of engineering and administrative work, can be performed by support personnel.

By separating project management and construction management, scarce PM resources can be preserved for other SEC requirements.

CONSTRUCTION MANAGEMENT ORGANIZATION within SEC

SEC makes available a number of resources for performing construction management so as to provide a great deal of flexibility in staffing a project's construction management team. Available resources include:

In-house personnel from the technical branches, and;
Engineering support service or A/E contractor personnel.

With respect to the use of service contractor or A/E contractor personnel to support construction management, such services are purchased by the Government through "menus of services" format under which specific services can be selected. As will be seen in later sections of this manual, the "menu of services" offers a wide variety of engineering support, ranging from technical consultation on an as-requested basis to daily administration of the entire job.

The approach for performing Construction Management on a specific project is typically determined by the Project Management Team (PMT) which is charged with overseeing SEC's construction management efforts and providing staff support to the project team. In collaboration with the division's management and in consideration of available resources, the Project Management Team makes staffing recommendations which:

(1) Leverage the experience of senior engineers with limited availability for CM work by purchasing contractor support for the majority of CM tasks. This approach allows experienced in-house personnel to focus on high risk or complex circumstances.
(2) Provide experience to junior engineers who need exposure to construction field activities for professional development.
(3) Level tasking between in-house and contractor resources to maintain division schedules and to sustain commitments to SEC's customers.

The following table illustrates the available options for staffing COTR, Construction Manager and engineering support functions on a project.

COTR	CONSTRUCTION MANAGER	CONSTRUCTION ENGINEERING	PHASE SUPPORT
PM	PM	In-House	
PM	PM	CS	
PM	CS	CS	
PMT	PMT	CS	
PMT	CS	CS	
PMT	PMT	In-House	

Table of available options for staffing construction management.
PM = Project Manager
PMT=Project Management Team
CS=Contract Support Service
In House=SEC in house engineering support

The number of options available to SEC for staffing the project team during the construction phase makes it impractical to define a single CM organization, which applies to every project. Therefore, it is difficult to maintain procedures that apply to every circumstance. Nonetheless, the drawbacks of maintaining flexible-staffing options are preferable to the constraints imposed by forcing a rigid organizational structure on the dynamic staffing needs of SEC.

This manual provides uniform guidelines for the execution of the many tasks that are required to successfully complete the construction phase.

APPLICATIONS

The Langley Construction Management Manual is a guide for NASA employees and service or A/E contractor personnel involved in construction management activities. The manual establishes general policies and procedures for managing facility acquisition projects and describes the team structures, which are formed to manage the construction phase. Although management processes are developed to a fair degree of detail, the manual reserves much discretion for the individual project manager and project team members.

Program managers can refer to the manual to acquaint themselves with the specific responsibilities of various SEC branches in the support of the construction phase of a project. The manual provides a framework for assessing the resource needs of a project team and for evaluating the team's effort.

PM's and COTR's will find the procedural guides helpful in maintaining their focus on the essential management activities required during construction. Accountability and responsibility of team members is outlined as are procedures for contracting engineering support to supplement NASA's project team.

Engineers or technicians with limited exposure to construction activity will benefit from the manual's overview of construction management objectives and principles in Section (2). Supporting engineers/technicians, contractors and administrative staff can refer to the process outlines in Section (3) for guidance in the execution of construction management activities.

Non-SEC personnel can use the manual to become familiar with the division's policies and procedures concerning facility acquisition. SEC customers can identify their involvement in the process and obtain an outline of the services they should receive.

SECTION (2)
THE CONSTRUCTION PROJECT and
CONSTRUCTION PROJECT MANAGEMENT
DIRECTORY

INTRODUCTION

Facility acquisition projects evolve through several phases starting with a concept and ending in the turnover of a completed facility. Between concept and turnover projects typically pass through several interim phases including:

Preliminary design
Final design
Bid period
Construction
Shakedown and Commissioning
Turnover
Warranty

During preliminary and final design professionals apply theoretical and code based engineering principles to develop solutions to meet project criteria. After the design phase, builders and contractors engage in the actual construction of the work and facility operators, assisted by designers and constructors typically play a significant role in shakedown, commissioning and turnover. The warranty phase of a project involves the operator, the builder, and the various enterprises issuing the warranties.

The skills required for each phase are brought to the project by the owner through the design team, the construction management team and the shakedown and commissioning team, which are assembled to support the work at appropriate times. The constructor and the designer typically staff project teams within their own organization to apply the appropriate skills. Although individuals on each team will vary according to the skills required, the project teams are comprised of members from the owner, the designer and the construction contractor's organizations.

These three agents—the owner, the designer and the construction contractor—collaborate to bring a facility project to successful completion. How they collaborate depends upon the phase of the project and the type of delivery system under which the project is being accomplished.

NASA's facility acquisition projects are generally procured under a three-step design-bid-build process. (Design-bid for short.) Under this form of project delivery, the design and construction phases are distinct and separated by a bidding process wherein the construction contractor offers to construct the project through one of several contract instruments, including:

Firm fixed price/invitation for bid (IFB)
Negotiated
Best value/request for proposal(RFP)
Cost plus
Guaranteed maximum price with or without incentives

The construction phase of a design-bid project often finds the owner, designer, and contractor, at odds with each other with respect to what exactly is required by the plans and specifications. Discussions frequently refer to the "intent" of the design, a phrase that often leaves the contractor positioned to request additional compensation for change orders. Because interpretation of the drawings is an issue with significant cost implications for the contractor and equally significant quality implications for the owner, the design-bid method of project delivery benefits from every effort to establish and maintain good communications between owner, contractor and designer. Consequently, good communications is a requisite to a successful construction phase.

NASA also uses design-build as a project delivery system. Design-build offers some attractive advantages, including a strong link between design and construction and shorter completion schedules.

The phases of a project can overlap under a design-build delivery and principle agents are reduced to the owner and the design/builder. With fewer parties involved, issues can be communicated somewhat more effectively, but design-build presents other challenges for the project. Under design-build, the owner is at somewhat greater risk of failing to have the project requirements completely and fully identified and accommodated when the facility is finished. Hence, as is the case in design-bid procurements, good communication, focused upon identifying and satisfying the owner's requirements, is requisite to a successful design-build effort.

To promote communication and contain the risks, a project construction management team is typically established to manage the construction phase. As discussed in Section (1), at NASA LaRC, the project construction management team is assembled from a variety of available resources and is headed by the COTR. The project construction management team represents the interest of the owner—providing overall direction to the designer and/or the construction contractor.

The remainder of this section presents a general discussion of the role of the owner, the designer and the contractor, primarily from the perspective of a design-bid project delivery. For the most part, however, what is presented also applies to design/build. Additionally, this section provides a general discussion of the philosophy of effective construction contract management and construction contract administration. Detailed procedures for the project construction management team personnel are presented in Sections (3) and (4).

THE ROLE OF THE OWNER

At NASA LaRC, the owner is the government and the interests of the government are attended to by a number of operational and staff organizations. Hence the owner is not simply the Contracting Officer (CO), the COTR, the PM or the building occupant for whom the project is being built. Instead, the owner's interests and responsibilities are vested in many different individuals who must coordinate their interests and efforts.

Although technical management of Construction of Facilities (CofF) and Research and Development (R&D) projects reside within SEC; the FAR reserves authority for committing government monies to the CO who exercises contract management from LaRC's Office of Procurement. The separation of contracting authority from technical authority necessitates a carefully orchestrated team approach to maintain control of the construction project and, most importantly, to ensure that the needs of the end user are met. The project team then, acting for the government, assumes a primary role as the owner whose responsibilities include:

1. Establishing detailed project requirements and communicating them to the designer and constructor
2. Fully disclosing relevant information
3. Promoting effective communications among team members
4. Establishing a realistic budget
5. Allowing adequate time for performance
6. Providing adequate funding for the project and making prompt payments
7. Making timely decisions

With respect to the implementation of facility projects, LaRC organizations are clients of SEC. In turn, SEC is charged with assisting other LaRC divisions and program offices in the development of a requirement document, which establishes the performance criteria and desired features of a proposed facility. The PM has responsible charge for interviewing the client to, identify, catalog, quantify and prioritize in the form of the "Requirements Document" all the relevant criteria for the facility project.

THE ROLE OF THE DESIGNER

The designer translates the owner's criteria into a facility concept, designs the work and prepares drawings and specifications describing the new facilities to be constructed. The designer evaluates the technical and non-technical elements of the owner's facility project and develops documents, which are used by the construction contractor to build the facility. Sometimes the government is the designer—as is the case when SEC performs an in-house design.

Designer responsibilities include:

1. Assisting the owner in establishing realistic objectives related to cost, schedule, and performance
2. Delivering a design that meets the owner's objectives
3. Developing constructible details and providing contract documents that can be interpreted and accurately priced by the constructor
4. Efficiency and economy in the design
5. Ensuring that the completed design complies with applicable codes, regulations, and laws
6. Interpreting the design documents when questions regarding the intent of the design are raised

THE ROLE OF THE CONSTRUCTION CONTRACTOR

The contractor commits to build what is represented in the contract documents. To the extent that the plans and specifications are not ambiguous and support a single interpretation that is consistent with the owner's expectation, the constructor will be able to satisfy the owner's quality standards. On the other hand, if the owner or the owner's agents and the contractor do not concur in their interpretations, quality issues may arise in the construction phase.

Under a design-bid project delivery, the constructor's responsibilities include:

1. Conforming to the contract documents as modified or amended
2. Planning, supervising and controlling the construction work, including the performance of subcontractors and suppliers
3. Providing required resources (i.e., labor, material, equipment, supervision and management)
4. Cooperating to minimize the cost and impact of changes and making value engineering proposals as provided for under the contract with the owner
5. Allowing job site access for other team members or third party contractors as provided for in the contract documents

THE PROJECT CONSTRUCTION MANAGEMENT TEAM

A project construction management team is assembled to fulfill the government's responsibilities during the construction phase. A variety of NASA LaRC organizations are involved in the construction project organization, either through affiliated support service contractors or by direct involvement of civil service personnel. SEC and Office of Procurement share the majority of responsibilities but OSMA, OSEM, and FSSD, also have significant roles.

Individuals are brought together in a Project Construction Management Team as outlined in Figure (2). Very large or small projects may involve more or fewer organizations as required for efficiency, or special needs, and frequently, a single individual will serve in several positions. However, the basic organization is fundamental to all projects.

SEC's customer, or client, is the focus of the team and the end user whose requirements the project was conceived to satisfy. Fulfilling the customer's needs is the primary purpose of the project and primary objective of the project construction management team.

A Facility Coordinator and Facility Safety Head is designated by name in each NASA facility and both are generally involved in the construction phase when construction is within their building. Even if the Facility Coordinator or Safety Head is not a direct sponsor of the project, each has a primary interest in the project.

The Contracting Officer (CO) is the lead administrator of the project team during construction and is responsible for implementing effective controls to ensure compliance with the Federal Acquisition Regulation pertaining to the contract advertising, award, and administration. All decisions affecting the terms of the written contract, except those specifically delegated in writing to others are reserved for the Contracting Officer.

The Contracting Officer's Technical Representative (COTR) is the Contracting Officer's principle staff advisor for technical issues. The COTR's primary objectives are (1) to deliver finished construction that conforms with contract plans and specifications, and (2) to ensure compliance with applicable Federal Acquisition Regulations. If the COTR and the PM are separate individuals, the PM serves as the COTR's project engineer. Generally, if the CM is a Government employee, he is designated as COTR and the PM is designated the alternate COTR.

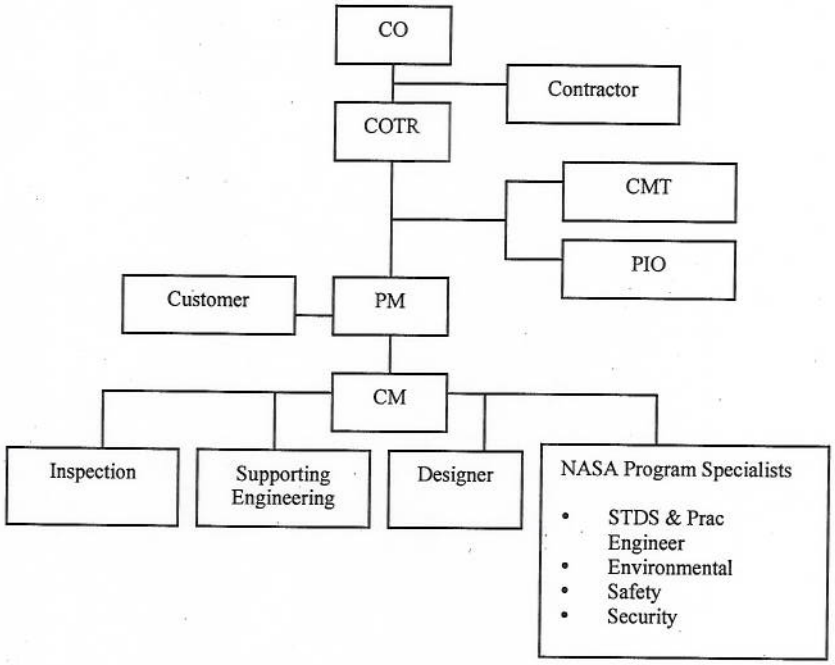

Figure (2)
The Project Construction Management Team Organization for Facility Acquisition Projects at NASA, LaRC.
CO=Contracting Officer
COTR=Contracting Officer's Technical Representative
PM=Project Manager
CMT=SEC Construction Management Team
PIO=SEC Program Integration Office
CM=Construction Manager

The COTR has limited authority to commit the Government to make payments under changed conditions and to accept completed work but only to the extent that such authority is delegated by the CO for a specific project. Specific COTR responsibilities are delegated in a letter from the CO and typically include:

1. Monitoring contractor performance and keeping the Contracting Officer informed of progress
2. Enforcing contract specifications
3. Endorsing/recommending the amount due on contractor pay requests
4. Recommending contract changes
5. Establishing controls to prevent the contractor's performance of unauthorized work
6. Preparing/approving cost estimates for contract changes and obtaining additional funds, if necessary
7. Accepting completed work

The role of Project Manager (PM) is outlined in Section (1) of this manual. As indicated in the organizational chart in Figure (2), the PM retains a central role in the project during the construction phase, even though the day to day activities may be the responsibility of other individuals.

The Construction Manager (CM) provides management staff support to the PM and the COTR by monitoring the progress and performance of construction and by serving as a facilitator between the construction contractor, NASA and in some circumstances, the designer. Section (3) of this manual provides a fairly exhaustive list of the activities typically performed by the CM, however, the scope of the CM's responsibilities varies depending on the level of support desired by the PM or COTR and, if CM services are purchased through a Contractor, by available funding.

The SEC's Construction Management Team (CMT) oversees the construction management efforts and provides staff support to the project team. The CMT is a resource for the PM, which makes available in house engineering support or service contract support for the performance of construction management functions. Responsibilities of the CMT include:

1. Recommending a mix of resources to satisfy COTR/PM requirements given the availability of resources and funding constraints;
2. Serving as Task Area Manager with responsibilities as assigned in the SSC Contract Management Plan.

Other SEC engineers, or support service contractor personnel or A/E contractor personnel provide technical engineering support for activities requiring their specialized knowledge and skills. For example, processing contractor submittals and engineering design changes are tasks frequently performed by supporting engineers when the work is of a specialized nature. Supporting engineers usually remain assigned to projects throughout the design and construction phases so as to provide continuity and consistency in government dealings with the contractor.

The SEC Program Integration Office (PIO) provides contract administration support. Change order processing, miscellaneous contract administration and acceptance of completed work are examples of administrative support provided by PIO.

Construction projects also require support from various divisions and branches within LaRC. For example, Office of Safety and Mission Assurance (OSMA) conducts safety briefings and reviews contractor safety plans. The environmental group reviews HAZMAT and environmental plans.

CM ACTIVITY and RESPONSIBILITY MATRIX

As can be seen in Figure (2) the project construction management team brings together many individuals in many different LaRC divisions and branches. Typically, these individuals are involved with multiple projects and each may also be tasked with division responsibilities completely removed from the project. Hence the project team organization overlays a larger organization spanning various LaRC administrative units.

Accordingly, the organizational contributions can best be diagramed in a matrix, which lists the degree of involvement.

The matrix, presented in Figure (3) provides a starting point from which the construction project team can be assembled. The CMT, with the concurrence of other SEC authority builds the project team from the appropriate organizations represented in the matrix and having the available resources (i.e. capable individuals) to staff the project team.

The involvement of LaRC organizations in the construction phase of a project is indicated in Figure (3) at one of three levels, namely:

1. Direct Responsibility,
2. Shared/Support Responsibility,
3. Shared Interest.

CM ACTIVITY	SSC	PROCUREMENT	SEC CMT	SEC Tech Branches	SEC PIO	DESIGNER	SEC CLIENT	CSU
Develop Acquisition Plan	N	S	S	D	S		I	
Set Up CM Organization	N		S	D	I			S
Obtain Regulatory Permits	Y	I	I	D	I	S	S	
Issue CM/I Task Order	N		D	S	I			S
Coordination Provisions for GFE/M	Y	I	S	D	I	S	I	S
Advertise/Bid/Award	N	D	I	S	S		I	I
Conduct Preconstruction Activity	N	D	S	I	I	S	I	S
Conduct Coordination Meetings	Y	I	D	I				S
Progress Payment Functions	Y	D	S	I				S
Progress Schedule Functions	Y	I	D	S	I		I	S
Prepare PCC Briefs	Y		D	S	I			I
Technical Submittal Functions	Y		D	S	I	S		S
Review/Approve VE Proposals	Y	I	D	S	I	S	I	S
Contract Correspondence Functions	Y	S	D	S	I			S
Inspection Functions	Y	I	S	S	I			D
Manage Change Order Process	Y	D	D	S	S		I	I
Maintain Lessons Learned	Y	I	D	S	S	I		S
Maintain As-Builts	Y		D	S			I	S
Manage Construction Warranties	Y	S	S	D			I	S
Claim Processing Functions	Y	D	D	S	S	I		S
Closeout & Acceptance Functions	Y	S	D	S	S	S	I	S
Evaluate CM/I Task Orders	Y	S	D	S	S		S	

D=Direct Responsibility S=Shared Support I=Shared Interest Y=Yes N=No

Figure (3)
Matrix of CM Activities and NASA Organizational Responsibilities
Table Key:
SSC=Support Service Contractor
CMT=Construction Management Team
PIO=Program Integration Office
CSU=Construction Services Unit

A review of Figure (3) shows that direct responsibility for most of the CM activities resides in SEC technical branches or the CMT or in Procurement. Other organizations provide support or have a shared interest in the outcome. The involvement codes are described below:

1. Direct Responsibility

Direct responsibility means having authority and accountability for making the decisions required to get the work done. It does not mean that the hands on work will necessarily be done by someone in the organization. Instead, it means that someone in the organization is responsible for seeing that the hands on work actually gets done. For example, if a task order is written for a particular CM activity, the service contractor will do the hands on work although the SEC Technical Branch retains responsibility. The service contractor is still accountable, however, because the technical branch personnel evaluate the task order service and grade work appropriately.

2. Shared/Support Responsibility

Shared/Support responsibility means having authority and accountability for providing supporting activity which enables the work to get done. Shared/support activity includes providing information or reports, processing documents or correspondence, making recommendations or other staff work. As in the above example, shared/support activity may be delegated or contracted through a task order.

3. Shared Interest

Shared Interest means having a vested interest in the outcome of the activity or in the proper execution of it. Shared interest includes the involvement of the facility coordinator, safety and others with similar association to the project. Organizations with shared interest may be required to provide information, accept or reject elements of the process or the work itself, make recommendations or perform other staff work.

Individual Involvement

Although CM activities are performed by an individual or group of individuals, individual positions are not listed in Figure (3) because the matrix focuses on organizational involvement. The process narratives and flow charts, included in the inventory of Construction Management activities in Section (3), describe CM activities more specifically and in a manner that permits discernment of individual accountability.

PRE-AWARD and POST CLOSE OUT CM ACTIVITIES

The construction phase of a project begins when the notice of award is issued and ends when final payment is made to the contractor. Most CM activities take place during the construction phase, however, some should be performed during the preliminary design or detail design phase while others occur after construction is finished, during start-up or in the first years of operation.

The PM and/or the COTR should be attentive to the following CM activities before work begins on site: (These activities are more thoroughly addressed in Section (3) of this manual.)

Acquisition Planning: The optimal time for Acquisition Planning is late in the preliminary design, before the start of detailed design. NASA's Facility Project Implementation Handbook (FPIH), NHB 8820.2A, dated July 1993, Section 3.11, provides a detailed discussion of acquisition planning.

Setting up the CM Organization: This activity should be performed either late in the Program Development Phase or early in the Design Phase. So, if CM services are to be provided by a contractor, sufficient time will remain before construction begins for the contractor to obtain any necessary resources and to integrate within the project team.

Obtaining Regulatory Permits: The process of obtaining permits should begin in time to avoid delaying the start of construction. Permits are typically required for pollution abatement or environmental remediation programs, asbestos or lead abatement, underground storage tank remediation or projects involving hazardous materials. Sites identified for archeological or historical values, work in wetlands, navigational waters or within flight path envelopes typically require permits of some sort.

Managing Construction Warranties: For a period of one year following final acceptance of the construction, the contractor is usually obligated to correct defects caused by defective materials and/or workmanship. Manufacturer's warranties on contractor-furnished equipment, roofing systems, coatings, and similar items may extend warranty protection for as much as 20 years, depending upon the provisions of the specification. During the design phase, warranties should be carefully considered and developed as appropriate. As construction is completed, the collection of warranty documentation and setting warranty start/completion dates should be addressed.

SECTION (3)
CONSTRUCTION MANAGEMENT ACTIVITIES
DIRECTORY

INTRODUCTION

Earlier sections of the manual outline SEC's approach to a flexible CM organization that permits staffing the project team with in-house or support service contractor personnel. Up to this point, discussion of CM activities has focused on the organizational level, without specifically identifying the tasks that an individual performs.

In this section, CM activities are discussed in more detail. The activity descriptions on the following pages clarify each organization's involvement in the CM process in addition to providing fairly definitive steps to be taken by the individual performing the activity. The narratives and flow charts in the following section briefly describe:

1. An organization's primary interests in each activity.
2. The role of supporting organizations.
3. The decisions made in the process.
4. The principle information or knowledge required making the decisions.
5. An indication whether a task order can be written to obtain contracted support service for the activity.

If a particular activity is not inherently governmental, a task order may be written in order to obtain contracted engineering support to perform the service. If contract support service is desired, a scope of work is developed in accordance with the guidelines provided in this section of the manual and in the Section (4). A task order is then issued per the SEC Engineering Support Service contract or A/E contract management plan.

A CM activity is complete when a specific document, report, form, log entry, or deliverable is generated. The activity deliverables are similar irrespective of whether the CM activity is performed with Government resources or through a service contractor.

If the CM activity is performed by NASA personnel, the person holding direct responsibility for the activity either completes the action or delegates the action and oversees the satisfactory completion of it. In the case of contracted services, tasks are completed by the contractor and the deliverables are assessed in order to evaluate the service contractor's performance.

MENU OF CONSTRUCTION MANAGEMENT SERVICES

In the remainder of this section, the CM activities, which were identified in Figure (3), Section 2, Page 14, are discussed in detail. A general description of the activity is provided; organizations having primary and support interests in the activity are listed; information required to perform the activity is identified; and the activity is identified as inherently or not-inherently governmental.

Some of the CM activities cataloged in the remainder of this section are discussed in a Process Narrative. These discussions include fairly detailed procedures and in some cases flow charts are included to better describe the process.

Each CM activity in this section is presented in a similar format. A key to the format is provided below.

CM Activity:	Name of the Construction Management Activity, from Figure (3), Page 14.
Description:	Brief description of the activity with references to supporting materials contained in Section 5, "References".
Primary Interests:	Lists LaRC and SSC organizations, which are shown in Figure (3), Page 14, to have direct responsibility for the CM Activity. Also indicates the responsibility of each listed organization.
Support Provided:	Lists LaRC and SSC organizations, which are shown in Figure (3), Page 14, to have shared interest in the CM Activity. Also indicates the interest of each listed organization.
Process Requirements:	Indicates the decisions, which are made during the process and identifies the key pieces of information needed in order to complete the activity.
Deliverables:	Lists the routine deliverables for the activity.
Task Order Available for support service contractor:	A yes indicates that the activity is not inherently governmental and that a task order can be written to buy the service from the division's engineering SSC.
Process Narrative:	The narrative gives requisite background information and discusses the procedures typically followed. In some instances, flow charts are presented to better illustrate the process.

In the remainder of this section, the following abbreviations are used:

SEC:	Systems Engineering Competency
OP:	Office of Procurement
CSU:	Construction Services Unit, Operated by support service Contractor or A/E contractor.
CMT:	Construction Management Team
OSMA:	Office of Safety and Mission Assurance
OSEM:	Office of Security and Environmental Management
PIO:	Program Integration Office
TAM:	Task Area Manager

Review the contract documents (i.e., drawings and specifications) and document errors, omissions, contradictions or other statements which may lead to:

1. Constructive contract changes
2. Unnecessary increases in the cost of work or in the time required to complete it
3. Other hindrances to job progress.

As a minimum, address the following: (1) economics, (2) availability of materials (e.g., GFE/GFM), (3) site restrictions, (4) local conditions that may affect the construction process (e.g., conflicting Government operations), and (5) conflicts between architectural, mechanical, electrical, and structural elements.

When specifically requested in the task order, consider machining and assembly issues such as: tolerances, fit and finish criteria and fabrication.

Deliverables: Provide to the PM or his designated agent by the date indicated:
Review comments presented on the prescribed form.
Red-lined drawings.

Description	Acquisition planning is the process of developing a contracting strategy for the project. The plan specifies the most suitable form of contract, construction phasing, use of GFE/M, special scheduling requirements and the optimal time to bid and award the project. The plan also accommodates any funding constraints on the project. FAR 7.105, see LMS-OP-5694, "Facility Systems Project Review Requirements" and LMS-OP-5689, "Facility Systems Project Management Plan Development", describe the contents of a written acquisition plan. Acquisition planning should begin early in the design phase. The decisions made during the planning process influence the development of the project plans and specifications.
Primary Interests	
SEC:	Technical considerations, schedule considerations, funding constraints.
AD:	FAR compliance. Form of contract.
CUSTOMER:	Coordination with facility operational need.
Support Provided	
AD:	FAR interpretations and recommendations on form of contract.
SEC PIO:	Interprets SEC policy and makes recommendations on acquisition strategy.
CUSTOMER:	Provides facility operational requirements.
Process Decisions:	Is the most suitable form of contract being used? Will the project be constructed in the most suitable time of year? Are multiple contracts preferable? Are construction phases workable and coordinated with the facility?
Process Requirements:	Facility scheduling requirements. Design criteria and project technical requirements. Knowledge of FAR constraints.
Deliverable:	Acquisition Plan.
Task Order Available:	No

SET UP CONSTRUCTION MANAGEMENT TEAM

Description:	Determine the involvement of SEC personnel and the mix of NASA and support service contractor resources, which will constitute the project Construction Management team. Name CM, reviewing engineer, COTR, and others. See LMS-OP-5689, "Facility Systems Project Management Plan Development".
Primary Interests	
AD:	Delegate COTR and Alternate COTR responsibilities per FAR.
SEC:	Make assignments compatible with the division's workload, project plans, and human resource management plans.
Support Provided	
SEC CMT:	Offers in house and support service contractor services. Make recommendations for CM organization.
Process Decisions:	Which organizational elements and which individuals will be assigned construction management functions?
Deliverable:	Project Construction Management Team Directory, COTR/Alt COTR Designation
Process Requirements:	Division/Branch/Team work loads. Available funds for task orders
Task Order Available:	No.

OBTAIN REGULATORY PERMITS

Description: Identify statutory or regulatory permits required, which may effect the construction phase. Initiate permit application processes.

This function, or parts of it, may be undertaken during the design phase.

Primary Interests

SEC: Maintain compliance and avoid delays from the permit process.
DESIGNER: Design compatible with regulatory constraints.
OSEMA: Regulatory and statutory compliance.
CUSTOMER: Accommodate facility operational needs.

Support Provided

DESIGNER: Resource for compliance requirements and permit application staff work.
CUSTOMER: Identify facility effluent streams, waste generation, and operational requirements.
OSEMA: Resource for requirements and NASA policy compliance.

Process Decisions: Are there any statutory or regulatory issues relevant to the timely execution of the construction contract? If so, have they been satisfied?

Process Requirements: Project scope of work. Knowledge of applicable laws.

Deliverables: (1) List of required permits and preliminary schedule and application requirements.
(2) Permit application packages.

Task Order Available: Yes. See Langley Form (LF-252), "Construction Management Services"

PROCESS NARRATIVE for Obtaining Regulatory Permits

Determining requirements for approvals and permits issued by regulatory agencies is a task usually performed early in a project's design phase. Assigning responsibility for obtaining permits should follow immediately thereafter.

Permits sometimes require months, even years, to obtain. In the interest of avoiding a delay in the start of construction, the application process for long-lead permits should begin early.

The process of obtaining a permit involves the following steps:

1. Identify the regulatory agencies having jurisdiction and the types of permits required.
2. Research agency application procedures and approval requirements. Initiating contact with the agency is recommended.
3. Establish a schedule for completing the application process. Coordinate with the regulatory agency. Get their concurrence on activities they have responsibility for completing.
4. Prepare packages for submittal to the agency. The COTR must approve all documents for release.
5. Deliver the permit to the COTR.

Phase (1)

Determine the permits required by law to be obtained prior to construction. Research the requirements for obtaining required permits. Prepare a schedule for completing the application process for each permit. Consistent with agency requirements and the approved schedule, prepare documentation packages for submittal.

Phase (2)

Deliverables

1. List of required permits and agencies having jurisdiction
2. Schedule for completing application process
3. Permit application packages.

Required Information

1. Project schedule and scope of work with estimated quantities of work identified for permit sensitive work packages.

ISSUE CM TASK ORDERS

Description: Develop scope of work and a Government estimate for construction management task orders. Follow procedures for issuing task orders per the SEC contract

management plan. See Langley Form (LF-252), "Construction Management Services".

SEC policy is that all projects will receive inspection services. Task orders for construction management are only developed if CM activities are to be obtained through the division's engineering support service contract or A/E service contract.

Primary Interests

SEC: Definitive scope of work.
Adherence to task order procedures and support service contracting requirements.

CSU: Definitive scope of work.

SUPPORT SERVICE CONTRACTOR: Definitive scope of work.

Support Provided

SEC CMT: Task Area Manager for inspection and construction management tasks. CM fund custodian.

SEC TAM: Issue task orders. Engineering support service contract COTR.

CSU: Estimate of CM costs. Scope concurrence.

SUPPORT SERVICE CONTRACTOR: Estimate of CM costs. Scope concurrence.

Process Decisions: Identify scope of work for contracted CM services.

Process Requirements: Critical items list and other special instructions for CM services. Project CM organization. Plans and specifications. Contract information. Available funds.

Deliverable: Task order document with purchase requisition and government estimate.

Task Order Available: No.

CM Function: **COORDINATE SUPPLY OF GFP**
(Government Furnished Property, Material/Equipment)

Description: Where government furnished material or equipment is used, verify that the specification and configuration is correct for the application. Confirm that purchasing schedules will have the property on-site when required by the general

	contractor. Expedite orders as appropriate. Facilitate transfer of GFE/M to the contractor.
Primary Interests:	
AD:	Correct materials arrive on schedule.
SEC:	Interface/connections details correctly specified.
CSU:	Facilitation of on-site operations and proper custody of GFE/M transfers maintained.
Support Provided	
SEC Technical Branches:	Specify GFE/M configuration. Coordinate design.
PIO:	Coordinated procurement.
DESIGNER:	Coordinate specification requirements and interfaces
CSU:	Facilitate transfer of materials. Confirm receipt. Locate materials.
Primary Process Decisions:	Is the purchase strategy and schedule for GFE/M coordinated with the construction schedule? Do purchase specifications and configurations match requirements?
Process Requirements:	Specifications and configurations
Deliverables:	(1) Verified listings of specified GFP. (2) Procurement and delivery schedules. (3) Expediting report. (4) Custody document.
Task Order Available:	Yes. See Langley Form (LF-252), "Construction Management Services"

PROCESS NARRATIVE for Government Furnished Property (GFP)

GFP consists of construction materials and equipment purchased by the Government for the project. The CM is responsible for (1) verifying that GFP conforms with specifications, (2) expediting delivery of GFP, if necessary, to fulfill contractual commitments and to avoid construction delays, (3) managing the transfer of GFP custody to the contractor, and (4) verifying the return of excess GFP and salvaged property.

Verifying that GFP conforms with specifications.

In performing this task, the CM has two objectives: (1) to avoid compromising the quality of the finished construction by allowing the contractor to use substandard products, and (2) to avoid contract changes caused by differences between the GFP delivered to the site and GFP specifications.

The process involves the following activities:

1. Verify the GFP purchase order accurately describes the product, specifies minimum standards, and defines all dimensions as required to assure the product can be installed without undue difficulty.
2. Inspect the supplier's factory to verify compliance with specified manufacturing standards.
3. Verify the delivered product conforms with purchase order specifications.

Expediting Delivery of GFP

The Government will often award a construction contract before receiving all GFP ordered for the project. In such a case, the Government must specify in the contract a date that undelivered GFP will become available for turnover to the contractor. Failure by the Government to turnover material by a specified date may warrant a contract time extension and/or a contract price adjustment under the "Suspension of Work" clause (FAR 52.212-12).

The process involves the following activities:

1. Coordinate GFP delivery schedules with the contractor's progress schedule. Negotiate a turnover date for undelivered GFP that allows for probable delivery delays.
2. Follow up with the supplier periodically to determine whether the current delivery date remains valid. If the expected delivery date slips beyond the promised turnover date, notify the contracting officer and provide a daily damage estimate for the contracting officer's use in compelling an earlier delivery from the supplier.

Managing Transfer of GFP Custody

Since GFP remains Government property after custody transfer, the contractor must return any GFP not included in the construction. Without adequate records describing the property transferred and identifying the person accepting custody on behalf of the contractor, agreeing on what property the Government is entitled to receive at the end of the project can be difficult. Having the contractor sign an exhaustive inventory at custody transfer, acknowledging receipt of all items listed clearly establishes what property was transferred. A form for documenting the GFP custody transfer process is available.

When the custody of GFP transfers, the contractor assumes responsibility for protecting the property from damage. If the property is damaged while in the contractor's custody, the contractor is obligated to pay the cost of restoring the property to its condition at the time of transfer. If the contracting parties agree on the condition of GFP immediately prior to transfer, the probability of a dispute over a defect found in the property while in the contractor's custody is reduced.

Clearly responsibility for protecting GFP belongs to the property custodian; nevertheless, a prudent CM will verify that the contractor takes reasonable precautions to protect any GFP in its custody. GFP is often difficult to replace or repair. If a critical piece of equipment is severely damaged, completion of the project could easily slip several weeks, perhaps months.

Verifying the Return of GFP and Salvaged Property.

At the end of the project, all GFP not incorporated into the work must be returned to the Government as well as any specified salvaged property. The CM first verifies GFP included in the construction; then, compares those quantities with quantities recorded on the GFP inventory, prepared when custody was originally transferred, to determine if any excess GFP exists. Finally, the CM coordinates and oversees custody transfer back to the Government.

CM Support Services; Typical Statement of Work

Review GFP purchase orders to determine whether purchased items are properly specified and that delivery dates will get the property on site before it is needed.

Conduct expediting services as required to protect scheduled delivery dates. Report as directed on delivery status and advise the COTR of expected or confirmed delays in delivery.

CM Activity: **ADVERTISE / BID / AWARD CONTRACT**

Description: Perform activities required by applicable FAR provisions or other regulations. Includes advertisement of the procurement, job shows, pre-bid conferences,

	answering bidders' inquiries and bid analysis to determine the low responsible bidder.
Primary Interests	
AD:	FAR compliance.
SEC:	Answer technical queries, adherence to procurement schedules, award to competent bidder.
CSU:	Job shows.
CUSTOMER:	Coordinate with facility operational schedules.
Support Provided	
SEC Technical Branches:	Respond to bidders' technical inquiries.
PIO:	
DESIGNER:	Resource for technical inquiries.
CSU:	Support job shows.
Process Decisions:	Are activities in compliance with FAR? Are all bidders' queries correctly answered?
Process Requirements:	Construction documents. Knowledge of FAR requirements. Job show dates.
Deliverables:	Bid document, IFB process documentation bid analysis documents, notice of award, list of bidders' inquiries and written responses.
Task Order Available:	Yes. See Langley Form (LF-251), "Inspection Menu of Service".

CM Activity:	**CONDUCT PRECONSTRUCTION ACTIVITY**
Description:	Issue notice of award and complete post award activity leading up to on-site activity by the construction contractor. Includes review of bonds and insurance certificates, confirmation of contractor qualifications and conducting the

preconstruction conference. This activity begins after determination of the low responsible bidder and continues through the preconstruction conference.

Primary Interests:

AD: FAR and contract compliance

SEC: Technical qualifications and preparation of the construction contractor for on-site activity
Early coordination of construction contractor's on-site activity

CSU: Advance notice of on-site activity. Coordination.

Support Provided SEC Technical Branches: Resource for technical issues.

PIO: Staff support to contracting officer.

DESIGNER: Resource for technical issues.

CSU: Coordination with customer.

Process Decisions: Applicable FAR requirements complied with?
Contract requirements complied with?
Efforts coordinated with all effected NASA LaRC organizations?

Process Requirements: Knowledge of FAR and contract requirements.

Deliverables: Inspection task orders typically include inspection presence at the preconstruction conference. Refer to the Langley Inspection Manual.

Task Order Available: No

CM Activity: **PREPARE/CONDUCT PROJECT COORDINATION COMMITTEE (PCC) MEETING BRIEFS**

Description: Prepare and deliver briefings for monthly PCC meetings. Report on schedule and budget performance and make projections of time to complete and cost at completion based upon construction contractor's latest schedule and progress to date. Identify major changes or problems and proposed solutions.

Primary Interests
SEC: Effective communication of project status to program managers.
Support Provided
PIO: Information source for current contract status. Prepare slides and reports.
CSU: Verify contract work in place status.

Process Decisions: None.

Process Requirements: Updated construction schedule. Updated change logs and submittal logs. Documentation of site activity.

Deliverables: PCC briefing materials.

Task Order Available: Yes, but only for the preparation of the PCC briefs. Conducting the brief is the responsibility of the PM, the COTR, or the Alternate COTR. See Langley Form (LF-252), "Construction Management Services".

CM Activity: **PROGRESS PAYMENT FUNCTIONS**

Description: Receive, record and distribute contractor invoices for review and approval and make recommendations to the Contracting Officer for progress payments to the

construction contractor per FAR, contract requirements, and NASA LaRC procedures.

Verify the work in place matches the percent complete amount on the invoice. Make recommendations regarding retainage.

Primary Interests

AD: FAR and contract compliance. Avoid over/under payment.

SEC: Avoid over/under payment.

CSU: Avoid payment for rejected or unapproved work or materials.

Support Provided

SEC: Verify work in place is accepted. Resource for technical compliance. Recommends payment amounts to the contracting officer based upon progress of the work. Provide COTR and CMT required signatures.

CSU: Verify percentage complete.

Process Decisions: Do invoice amounts match accepted work in place?
Is construction on schedule? What is the appropriate percentage for retainage?

Process Requirements: Contractor's invoice.
Inventory of work in place.
Updated construction schedule.

Deliverables: Progress Payment Logs & Certified Payroll logs
Monthly Progress Payment Analysis Worksheet

Task Order Available: Yes. Support services to evaluate percentage complete and to review certified payrolls are included in standard scope of work for inspection task orders. See Langley Form (LF-251), "Inspection Menu of Services".

PROCESS NARRATIVE for Progress Payment Functions

Construction contractors depend on timely progress payments to finance operations. Moreover, fair and timely payments for completed work are required under FAR Clause 52.232-27, Prompt Payment for Construction Contracts, which is included in most NASA LaRC contracts. The clause states that progress payments are due 14 days after receipt of the contractor's payment request by the Government billing office. The clause also obligates the Government to pay an interest penalty if it fails to pay an approved progress payment by the due date.

Sometimes, progress payments generate disagreements between the contractor and the Government because contractors tend to error on the side of overstating the amount of work in place while Government agents are primarily interested in avoiding overpayment for the value of work completed.

Reaching a concurrence between the contractor and the government on the percentage of the work completed before the contractor makes a formal billing is advantageous to both parties. It helps prevent the construction contractor from inadvertently overpaying subcontractors and vendors and reduces the likelihood that non-conforming work will be paid for.

An approach that has proven effective in determining the value of completed work is for the contractor's superintendent and the Government inspector to independently review work in place, then, meet to jointly develop completion percentages. Using this approach, the contractor can be reasonably confident of being

paid the amount requested and the Government can be confident that processing the payment request will proceed smoothly and quickly.

Invoice Routing—(See Page 32 Process Chart)

Contractors send pay requests to Commercial Accounting, Financial Management Division (FMD). FMD verifies packages are complete and properly certified.

Following its review, FMD sends copies of the contractor's detailed breakdown of completed work to the CSU, MS/428. If not consulted by the contractor prior to submitting the payment request, the CSU validates the contractor's stated completion percentages and verifies that the breakdown is based on an approved schedule of values. Over-billed line items are marked to reflect the percent complete recommended by the CSU. Otherwise, completion percentages are reviewed to verify that completion percentages and unit prices on the payment request agree with the values previously agreed upon.

The CM should evaluate the contractor's progress against the current approved progress schedule and notes variances. If actual progress has not kept pace with the schedule, grounds for retention may exist. Also, if the contractor's progress is such that completion of the work within the contract performance period appears doubtful, a "cure notice" may be required to protect the government's interests. A "cure notice" is a letter signed by the CO, detailing the specifics of a contractor's faulty performance and requesting a detailed corrective plan of action.

Under FAR Clause 52.232-5, Payments Under Fixed-Price Construction Contracts, allows the CO to retain a maximum of 10% of the payment amount if the contractor's progress is judged to be unsatisfactory. A test of unsatisfactory progress includes:

1. Actual work in place is less than planned for the payment request date as shown on the current approved progress schedule.

2. The contractor's lack of progress is due predominantly to his failure to diligently prosecute the work. Delays caused by conditions, which have affected the contractor's progress but were beyond his control, do not constitute unsatisfactory performance. Change orders, unforeseen site conditions, and work delays related to unusually adverse weather or conflicting government operations are examples of mitigating circumstances which should be considered when evaluating retainage amounts.

For a more detailed treatment of payment criteria for construction contracts, refer to FAR Clauses 52.236-2; 52.243-4; 52.249-10 and 52.222-7.

The CM should also verify that the contractor's certified payrolls are accounted for. Certified payrolls, fully and correctly executed, provide evidence that the contractor is complying with contract labor standards. Missing payrolls and payroll discrepancies may be grounds for withholding funds to finance potential labor violations.

The CM presents his findings and recommendations to the COTR who assesses the recommendation and makes final recommendations for payment to the CO. Recommendations to retain or withhold funds must be justified in writing.

The Contracting Officer authorizes payment.

Procedure Deliverables

1. Annotated copy of contractor pay request showing recommended changes. (As required)

2. Report on Analysis of Contractor's Progress.
3. Listing of missing payrolls and payrolls referred to Industrial Relations Office.
4. Log of contractor's pay requests

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CM Activity **PROGRESS SCHEDULE FUNCTIONS**

Description:	Analyze the contractors baseline schedule and monthly schedule updates, including both completed and planned work, to assess contractor's compliance with required completion dates. Compare schedule updates and projections to actual work in place. Where appropriate, investigate solutions to pending schedule constraints. Prepare response or cure letter to contractor as appropriate.
Primary Interests	
AD:	Schedule maintained. Avoid delays and claims.
SEC:	FAR and Contract compliance. Avoid delay claims.
CSU:	Contract compliance. Schedule allows quality workmanship and adequate inspection.
CUSTOMER:	Coordination with facility activities.
Support Provided:	
CSU:	Verify contractor's work in place status.
Process Decisions:	Is contractor adequately prosecuting the work? Are schedule constraints and delays apparent? If so, can they be avoided by appropriate management action?
Process Requirements:	Contract schedule requirements. Change order effects. Contractors work history. Documentation of site activity.
Deliverable:	(1) Milestone schedule and monthly reports (2) Progress photos
Task Order Available:	Yes. See Langley Form (LF-252), "Construction Management Services"

PROCESS NARRATIVE for PROGRESS SCHEDULE FUNCTIONS

Contractors are required to submit a monthly progress schedule consisting of a chart and a technical narrative. The chart compares the contractor's assessment of actual progress to date in completing the various parts of the project with planned progress, as reflected by the contractor's latest approved progress schedule.

Monthly progress schedule updates should be critically evaluated to determine if the contractor's current operating schedule is realistic; that is, can the contractor achieve the milestones indicated given the project's current status and the contractor's recent performance. If the schedule appears unrealistic, the contractor should be asked to explain how the milestones indicated will be achieved, and to present evidence to support questionable facts and assumptions. If, after discussing the schedule with the contractor, the reviewer remains skeptical, he should present his findings and recommendations to the COTR for further action.

THE CRITICAL PATH AND ITS LIMITATIONS

A construction project can be broken down into a collection of activities, some of which cannot begin until others are complete. Such activities are commonly called "dependent" activities. For example, a logical progression for constructing a building is site work, foundations, floor slab, structural framing, walls, roof, and interior finishing. Every activity in this sequence is "dependent" upon completion of the one immediately preceding it.

The sequence of dependent activities that span the longest time period on a project is called the "critical path." Every additional day required to complete a critical path activity extends the completion of the project one day. Likewise, completing a critical path activity one day earlier than expected reduces the

projected completion date by a day. A manager interested in knowing whether a project will finish on time should focus primarily on critical path activities.

Critical path scheduling methods are powerful analytic tools, unfortunately, determining a project's critical path is not a simple process. Even with the current scheduling software, scheduling a project and generating a critical path schedule is time consuming. The critical path is typically a function of the methods employed by the construction contractor, so it is difficult for a CM to develop an independent critical path schedule. Even if the contractor provides a critical path schedule, analyzing it in the limited time available is often difficult and leads to imprecise conclusions about the progress of the job.

USE OF A GOVERNMENT MILESTONE SCHEDULE

An alternative exists for the CM who wants to verify contractor progress and check schedule projections without dedicating large amounts of time to critical path techniques. It involves using a milestone schedule to establish completion dates for critical events. Unlike the critical path schedule, it is not concerned with the sequence or duration of various activities. Instead, milestones, or significant points in the construction process, are singled out from the overall project. Expected dates for achieving the milestone are set from the contractor's overall project schedule.

A milestone schedule is developed by analyzing the contractor's schedule of construction, which is a required submittal under the contract. Key events such as submissions for approval and delivery of long lead items, completion of underground work, drying-in a structure, utility tie-ins, etc., are extracted from the contractors project schedule. Appropriate dates are fixed for each event.

A planned milestone schedule can be developed from the contractor's initial progress schedule. The analysis of subsequent schedules then reduces to comparing the current milestones to those originally projected.

If the contractor submits a revised scheduled, the revised dates for the milestones can be determined so that future schedule submission can be compared to the updated milestone schedule.

Data base applications provide a convenient means for managing milestone schedules.

Maintain Photographic Records of Job Progress

Photographs are useful in documenting construction progress, property damage, technical details, materials used, methods of installation, and preexisting site conditions.

The primary purpose of progress photographs is to show the amount and type of work completed since the last progress photographs were taken. Progress photographs are useful (1) in presenting project briefings, (2) in motivating improved performance from a poorly performing contractor, and (3) as evidence to support adverse actions based on lack of progress.

To be useful as an historical record, a progress photograph must be labeled. The following information should be recorded on the back of every progress photograph: (1) Project, (2) Date & Time photograph taken, (3) Description of subject, (4) Location where camera stationed, (5) Direction of shot, (6) Photographer's name, (7) Serial number.

CM Support Services; Typical Statement of Work

Review the contractor's progress schedule submittals monthly. Evaluate the contractor's current operating schedule considering the current state of completion of each phase of the work and the contractor's recent performance. If the schedule appears unrealistic, identify specific areas that are questionable and explain your reasoning. Present findings to the project PM. If authorized to proceed further, meet with the contractor's project manager to review the findings and to consider additional information the contractor might have to offer. Report findings and recommendations to the project PM.

Deliverables. Report (monthly or as requested)

Information Required. Contractor's monthly report.

Develop a milestone schedule based on the contractor's approved baseline progress schedule. Monitor attainment of milestones and report dates when milestones are achieved. Update the schedule as appropriate based upon the construction contractor's updated schedule.

Deliverables. Milestone schedule, monthly reports.

Required Information. Contractor's approved schedule.

Compile a collection of progress photographs, which document construction. One set of photographs will be taken before groundbreaking. After construction begins, one set will be taken around the 15th of every month, until all construction work is finally completed and delivered. Submit one set of photographs to the project PM by the 25th of every month.

Deliverables

1. Progress Photographs (as requested)
2. Negatives File (end of project)

Information Required. Special instructions

CM Activity: **CONDUCT COORDINATION MEETINGS**

Description: At appropriate intervals, conduct job progress and coordination meetings with the general contractor and other interested parties. Set agenda, record action items, issue minutes. Manage action items.

Purpose of meetings is to identify critical work or management activities, which must be completed, or problems, which must be solved to maintain job progress.

Primary Interests:

SEC: Maintain schedule and contract compliance. Efficient problem resolution. Claim avoidance.

AD: FAR and Contract compliance. Claim avoidance.

CSU: Contract compliance. Facilitate job progress.

CUSTOMER: Coordination with facility activities.

Support Provided

AD: Resource for FAR compliance.

CSU: Coordinate on-site activity. Monitor job status.

Process Decisions: Is work progressing on schedule and per contract requirements? Are there any apparent conflicts or pending delays? If so, can they be mitigated?

Process Requirements: Contractor's updated schedule. Change order status. Submittal status. Knowledge of FAR and contract requirements.

Deliverable: Meeting agenda. Meeting minutes with action items list.

Task Order Available: Yes. See Langley Form (LF-252), "Construction Management Services"

PROCESS NARRATIVE for Construction Coordination Meetings

Coordination meetings with members of the contractor's project team provide an opportunity for parties to exchange information regarding the status of in-process actions, to discuss issues of mutual interest, and to engage in collective problem solving and decision making. Meeting topics typically include:

1. Scheduling issues: work progress, utility outages, submittals, material deliveries, and recovery plans.
2. Administrative issues: payments, RFI's, contract changes, proposals, disputes, and property transfer.
3. Technical issues: work around, quality standards.

CM Support Services; Typical Statement of Work

Conduct periodic coordination meetings with the construction contractor. Solicit agenda topics from the contractor's project manager, the project COTR, and the PM. Distribute a meeting agenda no less than one working day before the meeting. Record meeting minutes and prepare action lists summarizing commitments made during meetings. Distribute minutes and action lists within 5 working days following the meeting.

Deliverables for Coordination Meetings.

Agendas
Meeting Minutes
Action Lists.

CM Activity: **TECHNICAL SUBMITTAL FUNCTIONS**

Description:	Process and evaluate submittals to determine that proposed materials and methods comply with contract requirements. Make approvals, return for correction, or take other review action as required by contract specification Section 01330, "Submittals". Annotate and stamp submittals. Indicate required distributions. Check submittal status log for accuracy. Manage the submittal review process to maintain job schedule and avoid claims. (Submittal log functions and distribution are handled by the SEC Submittals Processing Team).
Primary Interests	
SEC:	Technical compliance. Action based upon engineering review.
DESIGNER:	Technical compliance. Recommend action. Review the submittal.
CSU:	Contract compliance. Facilitate work in place.
Support Provided	
DESIGNER:	Resource for evaluation of submittals.
CSU:	Verify that materials delivered conform to approved submittals.
Process Decisions:	Is submittal complete? Does it give adequate assurance that material or equipment will meet contract requirements?
Process Requirements:	Contract requirements. Contractor's submittals.
Deliverable:	Submittal status log. Status reports. Reviewed submittals.
Task Order Available:	Yes. See Langley Form (LF-252), "Construction Management Services"

PROCESS NARRATIVE for CONTRACTOR SUBMITTALS

Section 01330 of the construction contract specifications address submittal requirements in general and each technical section of the specifications lists the specific submittals, which the contractor is to submit prior to furnishing the material to the job.

Submittals are a very important and very time consuming construction management activity. Careful attention to the submittal process can help avoid delays and technical problems later in the job.

The CM is responsible for verifying that all submittals are properly reviewed to determine that the proposed materials described in the submittals comply with contract requirements. Submittal reviews are performed either by the CM, by the designer, or by other support engineers.

The submittal reviewer recommends action--approval, or otherwise--to the COTR who signs the submittal transmittal and takes action for the government.

The Submittal Process

The submittal process, as illustrated on Page 39 chart, involves 3 main government functions: (1) Process Control, (2) Technical Review and Approval, and (3) Submittal Management.

Process control involves the accounting of the submittal receipt, distribution and return to the contractor. Technical review is the comparison of the submittal to the contract specifications and submittal management is the oversight of the complete process for schedule and contract compliance.

The three key positions in the process are the Submittal Processing Team (SPT) the Reviewing Engineer (RE) and the COTR. Separate individuals may fill these positions or the CM may carry out the functions. Typically, the SPT functions are performed by service contract personnel or A/E contract personnel.

The contractor sends all submittals directly to the SPT as directed by Section 01330. After logging receipt of a submittal, the SPT forwards the package to the assigned RE, with copies of the transmittal sheets to the COTR and the PM.

After completing the review, the RE recommends appropriate action and fills out the corresponding boxes on the transmittal sheet. Packages are then sent to the COTR for approval.

After the COTR signs the transmittal sheet, and completes the submittal form for correct distribution, the submittal package goes back to the SPT. For approved submittals, the SPT distributes per distribution instructions. For submittals marked "Returned for Corrections," the custodian returns the original package to the contractor and sends copies of the signed submittal transmittal to the COTR and PIO.

If a package is not reviewed and returned to the custodian within ten working days, follow up action is initiated.

Pre Construction Preparation for Submittal Review

The submittal process requires the COTR/PM to assign review responsibilities and develop distribution plans prior to the start of construction. Such plans should be developed during the latter stages of design when the project construction management team is being assembled. Such assures enough time to prepare a submittal log and submittal transmittal sheets.

The extent to which the COTR/PM becomes involved with submittals can be tailored to suit individual project needs. For example, there may be submittals the COTR/PM may want to review personally. In such cases, the COTR/PM designates himself as the RE, and seeks technical assistance from supporting engineers as needed.

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The Submittal Log

A well designed, properly maintained submittal log is required to maintain effective control over the process. It serves as a consolidated list of all required submittals and provides the current status of each: Not received, In process, Approved, Awaiting resubmittal, etc. It can be used to identify overdue submittals, measure the time required to process completed submittals, and identify any in-process submittals.

A database application is recommended for efficient submittal management.

The CM, PM or COTR should carefully review the program output and the contract specifications to verify that all submittals are listed. Typically, the extract program only lists 80 to 90 percent of the required submittals. Selected submittal entries may need to be added manually to the log.

CM Support Services; Typical Statement of Work

The standard statement of work in Section (4) lists the submittal management services that are available through the SEC support service contract. The submittal log is produced and submittal-processing functions are handled through the dedicated task order for submittal processing. This work is performed by SEC's support service or A/E service contract. If a task order for submittal reviews is not issued, the COTR or PM must perform the function or find other resources to accomplish the following tasks:

(1) Manage the Submittal Process

Review the submittal logs prepared by the Submittal Processing Team (SPT). Make revisions as required. Provide periodic reports detailing the current status of all submittals, highlighting submittals requiring management attention, and analyzing the submittal process's effect on the project. When appropriate, take action to enlist the construction contractor's cooperation in satisfying contract submittal requirements.

Deliverables from the Submittal Management Process

(a) Update Submittal Log.
(b) Pre-printed submittal transmittal sheets to be used by the construction contractor in forwarding submittals to NASA.
(c) Reports.
(d) Draft correspondence to the construction contractor where appropriate to direct attention to delinquent or disapproved submittals.

(2) Review Technical Submittals

(1) Review submittals, as assigned, to determine whether products proposed for use in the construction satisfy contract specifications. Determine (a) whether the submittal package is complete, (b) whether the data provided is sufficient, and (c) whether the products described are acceptable. Fill out the transmittal sheet to indicate proposed action, and send the entire package to the COTR for approval.

Deliverables from the Technical Submittal Review

(a) Reviewed package marked up with comments. Review memos and comments as required documenting the review. Notations on conversations and citations of reference which were consulted.

CM Activity: PROCESS VALUE ENGINEERING PROPOSALS

Description: Evaluate value engineering proposals and coordinate reviews among appropriate parties. Initiate actions to accept and implement the proposals if the evaluation leads to acceptance.

Primary Interests:

SEC: Maintain functional requirements. Reduce cost of work.
AD: FAR compliance. Reduce cost of work.
DESIGNER: Maintain design criteria.
CUSTOMER: Maintain functional requirements.

Support Provided:

DESIGNER: Resource to evaluate VE proposal
CUSTOMER: Verify facility operational needs are met by VE proposal

Process Decisions: Will the VE proposal satisfy the technical and functional requirements of the project? Are other work elements effected, if so, is the effect accommodated? Should the proposal be accepted?

Process Requirements: VE proposal. Contract documents. Customer's design criteria. Current project status information.

Deliverable: VE Analysis Report

Task Order Available: Yes. See Langley Form (LF-252), "Construction Management Services"

CM Activity: **CONTRACT DOCUMENTATION FUNCTIONS**

Description:	Maintain control of contract correspondence to assure that issues are handled promptly and effectively. Facilitate timely and accurate responses in order to avoid delays, rework, and disputes. Includes drafting correspondence for COTR or CO signature.
Primary Interests:	
AD:	Correct interpretation of contract documents. Claim avoidance. FAR compliance
SEC:	Contract compliance. Claim avoidance. On schedule performance.
CSU:	Correct interpretation of contract documents. Facilitate work in place. Avoid rework.
Support Provided:	
AD:	Resource for FAR/contract requirements.
SEC PIO:	Draft correspondence on selected topics.
CSU:	Provide contract status information.
Process Decisions:	Are all issues being addressed to the satisfaction of both parties within approximately 30 days from the time the issue is identified?
Process Requirements:	Contract requirements. Updated correspondence logs. Updated contract status information.
Deliverable:	Contract correspondence log and file of contract correspondence
Task Order Available:	Yes. See Langley Form (LF-252), "Construction Management Services"

PROCESS NARRATIVE for DOCUMENTING CONTRACT ISSUES

Managing contract correspondence is a time consuming task and one, which has significant effect on the timely progress of the work. Without an effective control system management action on issues raised in contract correspondence is often delayed.

Most letters or other contract documents require a response from the government--and the response is typically needed within a definite time period in order to avoid delay.

Document Control Using a Correspondence Log

A correspondence log is an effective tool for maintaining control of the process. It serves as a consolidated list of all incoming correspondence requiring action, identifies the primary action assignee and notes an action due date.

With Action by and Action to information concisely recorded, the log becomes a useful tool for managing timely responses. The log should be developed as a data base application in order to easily identify articles for which action is overdue. By sorting the log entries by due date, or by action code, the CM can quickly obtain a status report of correspondence issues.

Incoming documents which require a response are logged in when received. If the person who logs the document will not personally respond to it, it is distributed to the appropriate individual(s). When a response is sent, the date is logged.

By monitoring the log contents and the receipt and response dates a manager can verify that issues are being addressed. Delayed responses can be investigated and acted upon appropriately.

Requests for Information (RFI) Logs

The RFI is a special contract correspondence process through which one contracting party requests contract information from another. It is a formal process that, although intended to be easily used, is nonetheless, typically reserved for verifying that the other party is complying with the contract terms, or else, for requesting information needed in order to maintain compliance with the contract.

A predefined **RFI** form, see Langley Form (LF-253), "Request for Information", provides a convenient format for making inquiries and replying to them. On a given job, the forms are sometimes numbered sequentially, however, parties to the contract typically use their own numbering systems and sequential numbering is often difficult to maintain.

The contractor or the Government may originate an RFI. For example, a contractor unclear as to the proper interpretation of an ambiguous specification submits an RFI to the Government. Likewise, a PM with reservations concerning the methods a contractor plans to use in performing a task submits an RFI to the contractor.

Responses to RFI's are time sensitive. LaRC policy establishes a five working day response time. RFI's should be included in the correspondence log so that timely response can be maintained. The attached RFI chart on Page 45 shows the process.

CM Support Services; Typical Statement of Work

The standard statements of work in Section (4) lists the document management services that are available through the SEC support service contract. If a task order for document management is not used, the COTR or PM must perform the function or find other resources to accomplish the following tasks:

a. Manage Contract Correspondence
1) Produce and maintain a correspondence log, which records the date of receipt, internal processing dates and response dates as well as brief notations of the issue contained in the correspondence.

Receive and log all incoming correspondence, assign action based on attached guidelines, and send copies of all correspondence packages to the COTR. A correspondence package typically includes: 1) copy of letter, 2) where appropriate: (a) draft response, (b) indication of no action required, (c) supporting documentation.

Provide periodic reports listing unanswered correspondence, action due dates, and action assignees. For overdue correspondence identify interim actions taken to satisfy the originator and provide a revised due date.

b. Manage RFI's

1) Receive and log RFI's and distribute to the appropriate individual for action based on established guidelines. Send copies of all RFI's to the COTR. Include RFI's in the reports discussed above.

c. Deliverables for Correspondence and RFI Management

1. Correspondence Log
2. Periodic reports

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CM Activity: **MANAGE CHANGE ORDER PROCESSES**

Description:	Identify or confirm changed conditions and coordinate the development of change order documentation including RFC's, RFP's, drawing or specification revisions or other instructions to the contractor. Prepare government estimate, evaluate contractors proposal, conduct negotiations and issue change orders per FAR and NASA LaRC procedures. Maintain control logs and manage the change process to maintain job progress and avoid delays, claims, or other adverse action.
Primary Interests:	
AD:	FAR and contract compliance. Claim avoidance.
SEC:	Cost and schedule control. Meet project criteria. Claim avoidance.
DESIGNER:	Maintain design integrity. Fulfill engineer of record responsibilities.
CUSTOMER:	Meet project criteria. Coordinate with facility operations.
Primary Process Decisions:	Does a changed condition exist? How should it best be handled? If a change is issued, is the price reasonable? Are schedule effects addressed?
Deliverable:	Change Order Log. RFC/RFP package. Change Estimate. Negotiating Report.
Process Requirements:	Status of work in place. Contract requirements and project requirements. Funding limitations.
Task Order Available:	Yes. See Langley Form (LF-252), "Construction Management Services", (LF-328), "RFC Proposal Evaluation", (LF-329), "Emergency Field Directed Change (EFDC) Order", and NASA Langley Policy (LMS-OP-5692), "Facility Systems Procedures for Processing RFC's and EFDC's".

PROCESS NARRATIVE for Managing Change Orders

A change order is any order issued by the Contracting Officer to modify, add to, or otherwise alter the work from that originally set forth in the contract. Under FAR Clause 52.243-4, Changes, any written or oral order by the Contracting Officer that is interpreted as a change order is to be treated as a change provided that the Contractor gives written notice of such interpretation to the Contracting Officer.

Under the FAR, actions or statements by the Government, not intended to be a change order, may be treated as one if the Contractor provides written notice stating the date, circumstances and source of the order that the Contractor is interpreting as a change. The FAR provides for adjustment to the contract price for changes that increase or decrease the Contractor's cost or the time required for performance.

Changes include additions to or deletions from the work, changes in the methods of construction or manner of work performance, changes in Government-furnished property or facilities, or changes in the contract time or order of the work. Changes may be executed to correct errors in the contract documents or they may be Contractor proposed deviations approved by the CO and where appropriate, by the designer.

Origins of Contract Changes

Contract changes originate from two primary sources:

1. Directed changes
2. Constructive Changes

Directed Changes. A directed change occurs when the Government directs the Contractor to perform work that differs from or is in addition to the contract-specified work. A directed change may be additive or deductive in nature.

Constructive Changes. Actions or failures to act by the Government that increase the Contractor's cost and/or time of performance also constitute contract changes. These are called constructive changes and must be asserted in writing by the Contractor. Reasons for constructive changes include:

a. Defective Plans and Specifications.

This is defined as an error or omission in the contract documents which causes the contractor's work to be more costly or time consuming than originally planned.

The Government warrants the plans and specifications as accurate representations of existing conditions and new work to be provided by the Contractor. If the contract document specify an end product that cannot be produced or results that cannot be attained using current technology, the contractor cannot perform and is entitled to compensation for costs incurred in an attempt to perform to the defective specification.

b. Higher Standard of Performance than Specified

If the Government requires the contractor to perform a task not specifically required by the contract or to use more expensive materials than those specified the contractor may have grounds for requesting a contract price adjustment.

This type of change can occur when a Government agent, in response to a contractor's request for information, clarifies a contract ambiguity and in doing so prescribes a higher standard of performance than originally interpreted by the Contractor.

c. Improper Inspection and Rejection

If the contractor can show that the Government (i.e., the CM or the Inspector) rejected work which met the contract's specified requirements, the contractor may have grounds for seeking compensation for any rework he was required to perform.

d. Change in Method of Performance

This type of change occurs when, in spite of the contractor's plans to accomplish a task in a specific manner, the Government directs the contractor to use another method. If the task is more expensive to perform using the Government method, the contractor may be entitled to a contract price adjustment.

e. Change in Construction Sequence/Acceleration

If the Government prevents the contractor from performing according to its approved progress schedule or otherwise causes the contractor to deviate from its approved schedule, the contractor may be entitled to a contract price adjustment for any resulting damages.

Acceleration refers to an act by a Government agent causing the contractor to increase its rate of production. This usually occurs when a contractor has fallen behind schedule, and completing the

construction by the original contract completion date is important to a user. To be entitled to a contract price adjustment based on acceleration, a contractor must show: (1) that had the contract period been properly adjusted for Government-caused delays at the time the order to accelerate was issued, the contractor would not have been behind schedule, and (2) that the contractor incurred additional costs as a result of the order.

Sometimes, a user will specify a required completion date based on a scheduled event that presumes construction is complete. An example is the scheduled start of a contract to install new equipment in a facility currently under construction. In such a case, if the expected cost of delaying the start of the follow-on contract exceeds the cost of accelerating the current contract, it may be appropriate to pay the Contractor for an accelerated completion.

Accordingly, suggestions to the contractor to accelerate the work for the sake of making up lost time is inherently risky. If it happens that (1) the contractor is behind schedule and no legitimate grounds appear to exist for extending the performance period, or (2) compelling reasons exist to complete the construction earlier than the contractor projects, accelerating contractor performance may be advisable. However, formulate a working plan and hold open discussions with the contractor before issuing a notice to accelerate the work.

f. Failure to Disclose Critical Information

If information critical to accurately estimating the cost of the work is not disclosed in the contract, and the contractor cannot be reasonably expected to seek and obtain that information from another source prior to preparing its bid, the contractor may be entitled to a contract price adjustment for any resulting damages.

There are five change orders processes:

1. Emergency Field Directed Changes (EFDC)
2. Field Generated Request for Change (FGRC)
3. Unilateral Change Order
4. Supplemental Agreements
5. Field Orders and User Requests

Process change orders as per LMS-OP-5692, "Facility Systems Procedures for Processing RFCs and EFDCs". It defines procedures for processing RFC's (Requests for Change) and EFDC's (Emergency Field Directed Changes).

<u>EFDC's</u>

These are written orders issued to overcome conditions, which may impede the contractor's progress. The COTR may independently issue EFDC's expected to cost less than $7,000; EFDC's expected to exceed that amount must be co-signed by the Contracting Officer.

<u>Field Generated Change Requests (FGCR)</u>

A FGCR arises from the discovery of field conditions not anticipated when the contract documents were prepared. Unrecorded underground obstructions and utility lines encountered while excavating are common types of conditions which prompt FGCR's.

The contractor is usually the first to discover an unanticipated field condition. The contractor's first point of contact following discovery is its assigned inspector. The contractor and the inspector ordinarily evaluate the situation and develop a proposed course of action.

The inspector then notifies the CM, who reviews the situation and any proposal presented; then, discusses the situation with the COTR, the PM and/or the designer. Jointly they develop an action plan.

FGCR's often require immediate action to avoid or minimize work stoppages. Work stoppages not only delay completion of the work, but can result in damage claims from the contractor. If a work stoppage has occurred or is likely to occur before a written change order is issued, the Government may issue an Emergency Field Directed Change (EFDC), described above, after an acceptable program has been determined.

Unilateral Change Orders

These are written orders issued by the Contracting Officer without the contractor's concurrence. Their primary purpose is to authorize payment for additional work that must be performed before a Supplemental Agreement is processed. They also provide a means of adjusting the contract price or performance period when negotiations fail to produce agreement between the contracting parties.

Supplemental Agreements

These are bilaterally executed contract modifications where both parties agree on the terms and conditions set forth. They are used to finalize EFDC's and Unilateral Change Orders. Unless conditions dictate that an EFDC be issued, a Supplemental Agreement authorizes the contractor to proceed with the change work. Supplemental Agreements are the preferred means of implementing contract changes.

Field Orders

These are written orders issued by the CM, and accepted by the contractor, that meet the following conditions:
(a) Work will result in no significant change in either the contractor's cost or time of performance.
(b) Work will not significantly alter the form or function of the completed facility.
(c) Work can be safely performed without specialized engineering support.
(d) The construction contractor and CM agree on the methods and materials to perform the work.

Field Orders must be signed by both the Construction Manager and an authorized representative of the construction contractor. When executed, information copies of field orders will be distributed as follows: COTR/PM, PIO, Contract Specialist, and Safety.

A Field Order is not an official contract change order. Rather, it is a record of agreement between the contractor and the Government on two basic points: (1) how work not clearly defined in the contract documents will be performed, and (2) there is a negligible difference in cost and time to perform the work, when compared with the work as originally planned.

User Requests

User requirements sometimes change after award of a construction contract, but before the new facilities have been completed and turned over by the contractor. Such an event often prompts a user to request a change to the contract.

Additive user requested changes must satisfy the following conditions for acceptance:
(a) Sufficient project funds must be available to finance the new work.
(b) The benefits of doing the work by change order to the contract, a sole-source procurement, must outweigh the additional cost.
(c) The work must be within the contract scope. To be within the contract scope, new work must fit the general description of work found in Section 01010 of the contract.
(d) Impact on project schedule.

The project COTR decides whether to recommend a proposal to the Contracting Officer for accomplishment by contract change order. In evaluating a proposal the COTR may enlist the support of the PM, PIO, the CM, and others.

Negotiating Changes

Unless the Contractor responds to a change with a proposal that is agreeable to the Government in every aspect, the terms and conditions, which govern the change, will have to be negotiated.

Generally speaking, negotiation is the process leading to an agreement or understanding about such contract essentials as price, time, specifications and terms. The process of negotiation involves:

1. The preparation of an initial position by each party;
2. The analysis and evaluation of the other party's position;
3. Adjustment of one's own position to accept as many of the other party's views as possible.

For most changes, only the CO is authorized to conduct negotiations. However, the CM plays a strong supporting role. Defining a scope of work, preparing a Government estimate, analyzing the contractor's proposal, and recommending a pre-negotiation position are specific tasks that the CM may be expected to perform.

The process begins with developing a complete, detailed knowledge of the work or tasks included in the proposed change. A good way to gain such insight is to plan the work like a contractor. Developing a critical path, milestone, or gantt chart schedule showing (1) how the change itself will be accomplished and (2) how the change will fit within the existing project, is a planning approach commonly used by contractors that gives a very clear understanding of the work process. Besides providing basic understanding of how the work can be accomplished, the schedule approach also identifies manpower and material requirements for use in preparing a Government cost estimate.

A Government cost estimate is essential. The contract schedule of values is often a readily convenient source for pricing data. If the specific cost elements included in the change cannot be found in the contract schedule of values, check schedules from other contracts involving similar work.

Other possible sources include various construction cost-estimating guides available commercially.

The Government estimate should include all costs associated with the change, direct and indirect. Direct costs are the costs of labor, material, and equipment required to perform the change work. Indirect costs are all other costs incurred as a result of the change. These include the impact of the change on the performance of other contract work (i.e., lost efficiency) and the cost of extending the contractor's performance time (i.e., extended overhead).

Because the indirect costs mentioned above are difficult to estimate, they are often neglected until the contractor's proposal arrives, and then considered only if they appear excessive in the contractor's proposal. This approach is undesirable for at least two reasons: (1) it compromises the independence of the Government estimate, thereby biasing the outcome of negotiations in favor of the contractor; and (2) it extends the time required to prepare for negotiations following receipt of the contractor's proposal.

Analysis of the contractor's proposal may disclose unsupported and unallowable costs. Unsupported costs require further justification for acceptance. Unsupported costs include unit prices that differ significantly (+/-10%) from comparable prices in the Government estimate and cost elements not included in the Government estimate. When unsupported costs are discovered, ask the contractor to provide additional information to explain how the costs were determined. Unallowable costs are expressly forbidden for recovery on Government contracts.

Costs are not the only negotiable elements to be considered in preparing for negotiations. Sometimes contractors will accept a lower price in exchange for additional contract time, especially if they are behind schedule and trying to avoid liquidated damages. Relaxing a specification can also produce price concessions from the contractor. Obviously, controlling time and quality are important; and the negotiator may decide that trading time or quality for price concessions is not in the Government's best interests. The point is to develop options, maneuvering room, for the negotiator in the event an impasse develops.

Begin negotiations only after an initial position has been developed. The CO and COTR may wish to involve other members of the project team directly, or she/he may enter negotiations with the contractor alone. The team approach is best if the change involves technology outside the COTR's field of expertise, or other team members have contributed significantly in preparing the Government position. Regardless of who sits as a member of the team, only the CO is authorized to act. The CO may select another member of the team to serve as spokesperson during negotiations; however, the CO should always be present and ready to intervene if necessary.

There are two ways in which the negotiator can approach negotiation:

1. Consider the package as a whole;
2. Treat each of the elements separately and resolve each, one at a time, to arrive at a package agreement.

Perhaps the most effective method is to combine both approaches. Discuss the items one by one, noting points of disagreement. Discuss the differences without trying to resolve each as they occur. Decide which are most important to the Government and which can be relieved to some degree. Listen attentively to the Contractor as he explains his position on each point with the idea of detecting those he considers most important. Try first to reach an understanding on what work and what tasks are involved. When you are in agreement on the "what" and the "how," talk price. Try to arrive at a general meeting of the minds so that the agreed upon solution will represent not an agreement on individual items but a resolution of all of the points of disagreement.

To keep a tactical advantage during negotiations the following principles are suggested:

1. Work on the big issues; don't get bogged down in details. Don't haggle.
2. Be flexible in your position. Know the point where you will accept compromise.
3. Offer alternatives.
4. If an approach doesn't work, don't keep trying to use it. Use another.
5. Concentrate on "making a deal."

Of course, the act of negotiation achieves nothing if the negotiators do not have authority to commit to an agreement. Before beginning any talks, the spokesperson must have a clear understanding of the Government's negotiation objectives and what concessions can be made to achieve those objectives. The spokesperson should also confirm that the Contractor's representative has full authority to enter into a binding agreement.

Setting the physical stage for negotiations is also important. Choose a time and place away from the job so that all parties can work without interruption. Make sure that needed tools such as pencils, paper, copies of the contract documents, technical publications, etc. are available for reference. Never start before being totally prepared. Once started, try to initially pick points of agreement to set the tone of the meeting as cooperative rather than adversarial. If the precedent for agreement can be established early on, it will be easier to agree later on the tough issues.

Lastly, in spite of your best efforts, negotiations may fail to produce total agreement with the contractor on every aspect of the change. If that happens and an EFDC was issued, a unilateral change order may be required to authorize full payment to the contractor for the work performed. Before adjourning, attempt to

settle with the contractor's spokesperson on the specific points of disagreement; then, if appropriate, tell the contractor the amount of any additional price and time adjustments you will recommend to the Contracting Officer. If an EFDC was not issued, consider other options in addition to a unilateral change order, such as (1) postponing the work until the current contract is complete, or (2) having the work performed by another contractor.

Successful negotiations are a zero-sum game; that is, they do not produce a winner and a loser. Successful negotiations are achieved if both parties leave a negotiation feeling that the agreement reached was fair and equitable and they can look forward to continuing to do business together.

Documenting the Change

Once negotiations are complete, a record of negotiations must be prepared. Documentation includes the following information:

1. Change Order identification data,
2. Recommended wording of the change,
3. Reason for the change,
4. Contractor's proposal (CP) and Government estimate (GE),
5. The Government's pre-negotiation position with a narrative describing how it was determined,
6. The agreed-upon contract price adjustment with a narrative describing how the parties resolved their differences,
7. The agreed-upon contract time adjustment with a narrative describing how it was determined,
8. A statement indicating whether the price includes secondary impacts or not, the amount allowed for secondary impacts, and how that amount was determined.

CM Support Services; Typical Statement of Work

1. Manage contractor Requests for Information (RFI's). Research contract documents and perform field surveys as required to collect requested information. Keep NASA project managers informed of RFI's and obtain their concurrence on responses. Respond to RFI's within 5 working days of receipt.

2. Review and develop technical proposals for accommodating unforeseen site conditions. Present proposals to NASA project managers (i.e., COTR and PM) for approval. Draft Emergency Field Directed Changes (EFDC's) and deliver to the COTR within two hours of an oral order. Develop Request for Change (RFC) packages, consisting of a detailed statement of work (SOW), an engineering sketch, and a detailed cost estimate. Deliver RFC packages for changes that involve an EFDC no more than two working days after the EFDC is issued. For other changes, RFC delivery dates are negotiable.

3. Establish and maintain a change order management control system. Provide a (weekly/biweekly/monthly) report which summarizes the status of all in-process change orders.

4. Analyze the contractor's change proposals. Develop pre-negotiation cost objectives and provide supporting data. Provide additional assistance as requested by NASA negotiators.

5. Draft narrative reports documenting the results of negotiations. Deliver reports to the COTR five working days after negotiations conclude.

Deliverables

1. Reports summarizing CM performance processing RFI's
2. RFC packages, Written EFDC's

3. Change order Management Reports
4. Pre-negotiations objectives report
5. Records of negotiations.

Required Information/Prerequisites

1. NASA parties to be consulted in preparing RFI responses.
2. None
3. Management Objectives
4. Prerequisite: Prepared RFC package.
5. Prerequisite: Observed negotiations.

CM Activity: **MAINTAIN LESSONS LEARNED**

Description: Provide information to the project team regarding construction problems, misinterpretations, change orders and other on-site developments—knowledge of

which may contribute to an improved facilities acquisition process. Maintain Lessons Learned files. Distribute to appropriate parties.

Primary Interests:

SEC: Process improvement. Better designs and facility lifecycles.

DESIGNER: Process improvement. Better designs.

CSU: Process improvement. More constructible designs.

Primary Process Decisions: What could be done better to improve the quality of the constructed product? Where should the steps be taken? Who should be advised of the lesson learned?

Process Requirements: Knowledge of job progress. Contract plans and specifications.

Deliverable: None

Task Order Available: Yes.

CM Activity: **MAINTAIN AS-BUILT DRAWINGS**

Description: Review the contractor's redlined as-built drawings for accuracy and completeness. Make modifications as required.

Transfer as built redlines to CAD facility base-line drawings. For tunnel control systems and other work incorporated into the facility resume, perform point to point checks during construction and verify contractor's red lines. Obtain signatures and verify redline to CAD translation of point to point as-built control drawings.

Primary Interests:

CSU: Verify contractor as-built and point to point redlines. Verify redline to CAD translations.

SEC: Accurate, timely as-built record and configuration control drawings. Conduct underground as-built surveys.

OSEMA: Configuration control integrity.

CUSTOMER: Configuration control integrity and availability of as-built conditions.

Support Provided:

CSU: Verify construction contractor's redlines.
Point to point verification for CCD work.

OSEMA: Resource for Facility System Safety Management.

Process Decisions: Are contractor's redlines accurate? Are red lines to CAD translations accurate? Proper signatures obtained? Distributions made?

Process Requirements: Contractor's as-built red lines.

Delivable: CADD As-built files and disks. Provide cards for placement into engineering drawing files.

Task Order Available: Yes. The Langley Inspection Manual includes as-built drawing verification as a routine inspection function. See Langley Form (LF-251), "Inspection Menu of Services", (LF-252), Construction Management Services".

PROCESS NARRATIVE for the AS-BUILT DRAWING PROCESS

SEC contract documents usually require the construction contractor to maintain a set of contract drawings that include all approved changes and as-built conditions. The contract also requires that the contractor keep these drawings continually updated and available at the job site. These drawings are commonly known as "As-builts."

Maintaining the as-built drawings is responsibility of the construction contractor, verifying that the contractor is doing it is the inspector's responsibility, and overseeing the complete as-built cycle and assuring updated drawings are delivered to the facility is the CM's task. The as-built process included:

1. Verifying that the construction contractor is maintaining as-built drawings as required.
2. Verifying that as-built drawings are complete and correct.
3. Revising record copies of the contract drawings to reflect as-built conditions when construction is completed.

Recommended Procedures:

1. Meet with the inspector and the contractor shortly after the job site office opens to discuss procedures for maintaining as-builts. Find out who the contractor has appointed to record changes and what controls have been established to ensure no changes are inadvertently overlooked. Also, outline for the

contractor your program for fulfilling your responsibilities and jointly establish a system for labeling changes on the drawings.

2. As a step in the process of validating a contractor's pay request, verify that as-builts accurately reflect changes reported as 100% complete.
3. Verify that approved deviations authorized by field orders are recorded on as-builts. Work authorized by a field order is usually completed the same day the order is issued. Allow at least two working days following field order issue to pass before checking as-builts.
4. Review the contractor's as-builts when submitted at the end of the project to verify that all changes are accounted for. Verify point to point checks conducted for all designated control drawings.
5. Revise the original contract drawings to reflect changes shown in the as-builts.

CM Support Services; Typical Statement of Work

The standard statement of work in Section (4) includes support service for the Maintenance of As-Built Drawings. If a task order is not used, the COTR or PM must perform the function or find other resources to accomplish the following tasks.

1. Verify that the contractor's as-built drawings include approved changes reported 100% complete by the contractor on a partial pay request. Verify that approved deviations authorized by field orders are recorded in the contractor's as-builts 5 working days after a field order is issued. Report cases of non-compliance to the COTR. Review the contractor's as-builts when submitted at the end of the project to verify that all changes are recorded. Verify point to point checks conducted for all designated control drawings.

2. Revise the original contract drawings to reflect changes shown in the as-builts.

Deliverables

1. Contractor redline drawings
2. Written report-noting discrepancies on as-builts as submitted
3. Finished Record Drawings
4. CADD discs
5. Drawing cards for each revised drawing.

CM Activity: **CLAIM PROCESSING FUNCTIONS**

Description: When disputes or potential claims become apparent, institute appropriate measures to record significant events as required to document job progress and contractual actions. Take appropriate measures to substantiate government and contractor actions for dispute and claim processing.

When claims develop assemble documentation, evaluate contractor and government positions and make recommendations for claim negotiations and settlement.

Primary Interests:
SEC: Claim avoidance. Satisfactory settlement of disputes.
AD: FAR and contract compliance. Claim avoidance.
CSU: Contract compliance. Facilitate work on site. Accurate job documentation.

Support Provided:
SEC: Staff work required to document government actions and substantiate government position.

CSU: Verify on-site activity, site conditions, actual work sequences.

Process Decisions: Do job conditions warrant additional actions to collect job information and document on-site activity? What information is needed? How should it be collected?

What is best course action if a claim is filed? How should actions be pursued?

Process Requirements: Knowledge of job site conditions. Job documentation. Contract requirements.

Task Order Available: Yes. See Langley Form (LF-252), "Construction Management Services".

PROCESS NARRATIVE for CLAIM PROCESSING FUNCTIONS

A claim is an action initiated to resolve a contractual point of contention between the Government and the contractor. FAR 52.233-1, Disputes, defines a claim as "a written demand or assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to this contract."

A claim is usually filed after the parties have tried and failed to settle an issue. Technically, a claim against the government does not arise until the contractor has asked for and received a contracting officer's decision which results in an unfavorable judgement against the contractor and which is then appealed.

Claims arise over a number of issues: (1) interpretation of the contract, (2) what constitutes extra work on the contract; (3) payments, (4) contract time extensions, (5) damages for Government-directed acceleration or slowdown, (6) damages associated with an Government-caused delay, (7) defective drawings or specifications, (8) unforeseen site conditions. In general, any issue whose outcome may increase the contractor's cost or time of performance is a potential claim. Unilateral change orders and other Government actions that interfere with the contractor's work plans often lead to contractor claims.

Documentation is an important element of any claims preparation strategy. Unrecorded facts supporting or refuting a claim are often difficult to establish after a claim is filed. The CM is responsible for documenting potential claims.

Photographs are an effective means of documenting field conditions, defective work or material or other physical evidence associated with a potential claim. However, care must be taken to properly label photographs likely to be used as evidence in resolving a claim.

A common point of contention is the cost of performing work associated with a contract change when the contractor is working under an indefinite quantity/undefinitized change or in the case of constructive changes. The best approach is to avoid these situations. If they do arise, however, controversies can be minimized if the parties jointly document the actual cost of performance as the work proceeds on a daily basis. This will establish what resources (i.e., labor, material, and equipment) were actually used on a specific task on a certain date.

Notify the COTR of all potential claims as soon as the issue is identified and understood.

CM Support Services; Typical Statement of Work

The standard statement of work in Section (4) includes support services for Claim Processing which can be ordered as part of a construction management task order. If a task order is not used, the COTR must perform the function or find other resources to accomplish the following tasks:

1. Document potential claims with photographs and daily reports itemizing related costs. Consider all unilateral change orders, Government interference, and situations likely to increase the contractor's cost and/or time of performance as potential claims. Notify the COTR when a potential claim situation arises and solicit guidance as to the type and number of photographs to take. Provide the COTR an accounting of actual costs for potential claims three working days after the additional work is complete.

Deliverables for Claim Processing Functions

Photographs and Cost reports.

CM Activity: **CLOSE OUT AND ACCEPTANCE FUNCTIONS**

Description:	Conduct acceptance and close out procedures from pre-final inspections through final inspection and punchlist completion. Assure completion of all contact close out and project start up activities.
Primary Interests:	
AD:	FAR and Contract compliance. Prompt closeout. Avoidance of liquidated damages.
SEC:	Contract compliance. Expeditious punchlist completion. Start-up enabling successful turnover to customer.
CSU:	Thorough pre-final and final inspections. Expeditious completion of punchlist.
CUSTOMER:	Project criteria met. Expeditious punchlist completion and facility turnover. Training and documentation delivered.
Support Provided:	
AD:	Resource for expediting/enforcing punchlist completion and closeout.
SEC PIO:	Prepare punchlist documentation. Document final inspections.
CSU:	Verify that work in place is complete. Coordinate punch list completion. Generate pre-final punchlists.
Process Decisions:	Are all start-up, turn over and close out requirements of the contract satisfied? Any unresolved issues? What actions are required to resolve them?
Process Requirements:	Contract requirements. Project requirements.
Task Order Available:	Yes. See Langley Form (LF-252), "Construction Management Services", (LF-330), "Facility Systems Construction Contract Completion Checklist", and NASA Langley Policy (LMS-OP-5693), "Facility Systems Construction Contract Closeout Process".

PROCESS NARRATIVE for CLOSEOUT AND ACCEPTANCE FUNCTIONS

Contract close out functions are important to the satisfactory completion of a project. A marginally successful construction effort can be satisfactorily completed if close out proceeds well and an otherwise notable effort can be diminished if the contract closeout is long and drawn out and leaves issues unresolved or incomplete.

A. The Prefinal Field Inspection

As project work nears completion, the CM and project inspectors meet with the contractor to discuss the process leading up to final inspection and acceptance of the completed work. Prior to that meeting, the inspectors work with the contractors field staff and subcontractors to prepare a prefinal checklist, which identifies all work that must be completed in preparation for the prefinal inspection.

When notified by the lead inspector that preparations are complete, the CM schedules a prefinal inspection. Participants should include, as a minimum, the CM, lead and support inspectors, and the NASA's COTR. Other parties, as designated by the COTR, may also attend. The primary purpose of the inspection is to identify any remaining discrepancies to be performed in preparation for the final inspection. Only work within the current contract scope may be included on the prefinal work list. Any additional work required to complete the project to the user's satisfaction is handled with a change order or performed under a separate contract after completion of the work in progress.

When the Contractor advises that the project is ready, the CM staff and the contractor jointly inspect the completed work. All discrepancies listed on the work list should be corrected before scheduling the final inspection. If the contract completion date is imminent and the user anxious to take beneficial occupancy,

it may not be possible to delay the final inspection until all work identified in the prefinal is complete. Nonetheless, every effort should be made to bring the work to a level of completeness that will result in a minimum punchlist.

B. The Final Inspection

When the job is ready, the CM notifies all parties of a time and meeting place. The inspection party should include, at a minimum, the following individuals:

- the prime contractor's designated agent.
- the CM.
- the lead inspector.
- the NASA COTR or designated agent (PM).
- User agents (Facility Coordinator, Research PM).
- The Contract Specialist from Acquisition.
- The SEC Contract administrator from the PIO.

The CM records all questions and comments during the final inspection and, within two days, publishes minutes of the proceedings. Copies of the minutes are distributed to all members of the final inspection party and any others designated by the NASA Project COTR. A proposed final punchlist, screened and approved by the Project COTR, is attached. Addressees are requested to submit additional proposed punchlist items to the COTR within 5 working days.

C. Acceptance of the Work

The CM and SEC's PIO meets with the Contractor to establish a definite timetable for completing all remaining contract actions. PIO drafts a letter, for the CM and COTR's concurrence and the CO's signature, to the Contractor accepting the contract work as substantially complete and listing all punchlist items. See Langley Form (LF-330), "Facility Systems Construction Contract Completion Checklist".

When notified by the contractor that all remaining construction work is complete or when the time for completing the work has elapsed, the inspector and as appropriate other project construction management team members and the contractor jointly inspect the work. If the work is acceptable and the contractor has fulfilled all other contractual obligations, the Contracting Officer invites the contractor to submit a final invoice. Otherwise, the Contracting Officer notifies the contractor that any actions remaining incomplete after a definite date will be completed by others and backcharged to the contractor. Both of these transactions are in writing. SEC's PIO and the COTR, in consultation with the CM prepares these letters for the Contracting Officer's signature.

D. Delivery of Contractor Documentation

In addition to the construction, the Contractor is also obligated to provide an assortment of technical data describing the completed facilities. The CM is responsible for verifying that all required data, as listed in the submittal log, is in the Government's possession before the contractor's final invoice is processed.

E. Contract Closeout

When satisfied that both the contractor and the Government have fulfilled all of their contractual obligations, the CM notifies the COTR that the contract is ready to closeout. See Langley Form (LF-330), "Facility Systems Construction Contract Completion Checklist", is a checklist of completion and closeout activities.

CM Activity:	**EVALUATE CM TASK ORDERS**
Description:	Evaluate engineering support service contractor performance per SEC contract management plan and applicable NASA LaRC procedures. Forms for the evaluation of inspection and construction management task order services are provided by the contract support service.
Primary Interests:	
SEC:	Accurate evaluations per applicable procedures.
AD:	FAR and support service contract compliance.
Support Provided:	
SEC ESFPB:	Make recommendations based upon SEC policy and provisions of the engineering support service contract management plan
SEC Technical Branches:	Evaluate contractor performance.
SEC CMT:	Task Area Manager
Process Decisions:	How well was task order work performed? What grade should be issued based upon the quality, timeliness, and efficiency of the support service contractor?
Process Requirements:	Task order deliverables and scope of work. Knowledge of job progress and job progress documentation.
Deliverable:	Task Order Evaluation Worksheets
Task Order Available:	No.

GUIDELINES FOR CONSTRUCTION MANAGEMENT
TASK ORDER DEVELOPMENT
DIRECTORY

INTRODUCTION

The construction management functions described earlier in this manual represent the broad range of activities that are generally required to be performed during the construction phase of facility acquisition project. As project manager, the PM is charged with cradle to grave responsibility for a project and unless construction phase activities are assigned to others, the PM remains accountable.

As noted in Section (2) SEC has a number of options for providing construction management services, including:

1. The PM acts as the construction manager and as the COTR,
2. Obtaining the services through other SEC in-house resources (Construction Management Team) or,
3. Through SEC's support service contract or A/E service contract (SSC).

If construction management functions are to be provided through in house SEC resources, the PM should contact the SEC CMT leader and his branch management to coordinate arrangements for staffing the project team with appropriate individuals. If construction management functions are to be supported with SSC resources the procedures in this section of the manual should be followed.

CONTRACTED CONSTRUCTION MANAGEMENT SERVICES

Construction management is made available through SEC's SSC by means of task orders which are developed to procure specific services for selected projects. The Task Area Manager (TAM), the PM or the appointed COTR or CM initiates the development of the task order. To avoid developing an original statement of work for each construction management task order, a standard which can be easily modified is provided. The standard statement of work lists all the CM functions defined in Section (3) of the manual.

To write a task order, select the desired services, fill in appropriate information about the project, and provide additional task order instructions where required to completely specify the services desired.

Issuing a construction management task order is a three step process.

1. A scope of work is developed (using a menu of services with line items referencing the standard CM statement of work) and issued to the contractor,
2. The government and the support service contractor prepare independent cost estimates,
3. The government and the contractor reach a concurrence on the scope of work and the target cost for services specified.

Construction management provided through the support service contractor or A/E service contract augments traditional inspection services. Under contracted construction management, most of the field interface with the construction contractor continues to be provided by the inspection staff.

A task order for inspection is required even if contract support service for Construction Management is not desired on a project. SEC policy requires task orders for inspection services on all construction projects. Inspection task orders are issued by the CM team in collaboration with the project PM or CM. Refer to the Langley Inspection Manual and TAM for assistance with inspection task orders.

Typically, concurrence on the cost of the CM work is reached in the following manner:

- The TAM issues the CM task order, a statement of work and a request for a cost estimate.
- The contractor evaluates the task order and prepares a cost estimate. The government prepares a cost estimate concurrently.
- The contractor submits a cost estimate and inspection plan. Concurrence is reached through communication between the PM the COTR or the TAM and the contractor's task manager. Communication may be over the phone with the conversation documented appropriately to allow a revision to the initial task order cost estimate.
- A task order is issued.

Task order status is reported monthly per the terms of the service contract or A/E service contract and weekly or bi-weekly cost reports are typically made available to the government by the contractor. The task monitor is responsible for managing the task order funding per the SEC SSC contract management plan. An on-line Task Order Management Information System (TOMIS) is also available to the project COTR and TAM for monitoring task order status.

If the task order costs exceed the amount authorized either the funding must be revised with sufficient funds or the scope of work must be decreased. In such cases, the work statement/cost estimating procedure is repeated and appropriate revisions are made to the task order.

CM TASK ORDER DEVELOPMENT

A well-defined work statement is the first step in developing a task order. By standardized menu of services and work descriptions contained in the previous section, the effort required to develop the task orders is minimized.

If services other than those listed on the standard menu of services are required, care should be taken to define the service concisely. For example, work statements such as "Monitor the construction contractor's adherence to the contract time and schedule and notify the NASA COTR of any schedule problems" should be avoided. A suggested wording would read: "During the course of regular site visits (or insert some minimum frequency), the construction contractor's schedule shall be noted and compared to the current approved baseline schedule. Report findings to the COTR in writing within 2 days of the visit."

The rationale for such wording is efficiency and accountability. Reviewing a schedule at specified intervals allows more efficient use of man hours. Additionally, the term "monitor" is a vague concept which could be interpreted to imply an extensive effort or a close working relationship with the construction contractor on the one hand or an indefinite loosely controlled effort on the other. The suggested wording defines a deliverable and a time frame for providing it.

Construction management activities require a considerable amount of time for the manager to become familiar with the project and for the CM staff to develop job control logs and other control documents. Accordingly, the CM task order should be issued **prior to the construction phase.**

The initial task order authorization should be issued and funding authorized prior to the pre-construction conference for the construction contract. Final concurrence on the cost of the services and resolution of any issues regarding the scope of work should also be reached prior to the pre-construction conference.

If the support service contractor is to be involved in answering pre-bid construction contractor queries, the task order should be issued soon after the IFB is distributed.

Since it takes about a week to process a task order, requests for CM task orders complete with a defined statement of work and funding should be delivered to the TAM seven to ten days before the preconstruction conference.

Evaluating the task order at the completion of the services is the responsibility of the SSC, task monitor and the task area manager. The contract management plan outlines the evaluation procedure. Evaluation forms will be provided by contract support service.

STANDARD STATEMENT OF WORK for CONSTRUCTION MANGEMENT SERVICES

Section (3) of the manual presents an extensive list of construction management services and indicates which services are available through a support service contractor. To make it easier to use the contracted support services. A menu of services has been developed which is consistent with the descriptions of work provided in Section 4.

To obtain a copy of the standard menu of services, see Langley Form (LF-252), "Construction Management Services". To issue the CM task order, simply select the items which will be included in the task order. Review the description of work for each item [contained in Section (3) and (4)] and make modifications if required in the space provided for "Additional Instructions."

Task order work statements should to preserve a "continuity of function". Maintaining "continuity of function" means that the services requested under the task order are packaged in such a way that:

1. processes are not interrupted,
2. each step of the process adds value, and
3. an opportunity to evaluate the support service contractor's performance is provided.

The standard statement of work maintains continuity of function by referring to specific services, which should be included as a prerequisite for other services. For example, **Manage the Submittal Process** is a CM function, which can be tasked to the service contractor. However, it should not be included in a task order unless the contractor is also tasked with producing a submittal log as specified in the item **Produce and Update Project Submittal Log.**

STATEMENT OF WORK
CONSTRUCTION MANAGEMENT SERVICES

Project Title:
Task Order No:

Provide the following construction management and engineering support services in accordance with the procedures contained in the LCMM and in the Additional Instructions contained in this task order.

Engineering support services shall be provided during the construction phase of the project as limited by the task order initiation and required completion dates, which are identified on the task order document.

Nothing in this task order is intended to authorize the CM to direct the construction contractor to perform work. The CM shall not give verbal or written instructions to the construction contractor which direct the contractor to perform work or dictate a method of construction or which may be reasonably interpreted by the construction contractor as directions or methods.

(1) See specification No. 0-00-0000.0000, Section 01010, Summary of Work, Parts 1.1, 1.1.1, and 1.1.2 for project summary.

(2) Contract Drawings are listed in specification No. 0-00-0000.0000, Section 01010, Summary of Work, Part 1.3.

(3) _____ sets of drawings and specifications will be furnished.

(4) The contractor shall coordinate services, maintain communication and obtain required consultation and approvals as specified in this task order with those listed below, and from time to time, with

others not specifically listed. Such coordination, communication and required consultations and approvals shall be conducted per the NASA/LaRC Construction Management Manual (LCMM), unless otherwise noted in the Additional Instructions to this task order.

Agent	Mail Stop/Phone	Phone	Fax
Contracting Officer:			
COTR:			
PM/Project Manager:			
Mechanical PM:			
Electrical PM:			
Other Support PM:			
Research Customer:			
Contract Administrator:			
PIO Administrator:			
Inspection Task Area Manager:			
Safety POC:			
Environmental POC:			
Facility Coordinator/FSH:			
Others: (See listing contained in the Additional Instructions to this task order.)			

LISTING OF ORDERED SERVICES

PRECONSTRUCTION SERVICES

No. PC1
Obtain Permits

Determine the permits required by law to be obtained prior to construction. Research the requirements for obtaining required permits. Prepare a schedule for completing the application process for each permit. Consistent with agency requirements and the approved schedule, prepare documentation packages for submittal as directed in the additional instructions of this work order.

No. PC2
IFB Services

Receive and log questions that are identified by the COTR. Respond directly to requests for assistance in locating information within the contract documents. If the required information cannot be found, refer the matter to the COTR. Provide a written brief of the issue to the COTR with recommended action.

SUBMITTALS PROCESSING

No. SP1
Manage the Submittal Process

Review the submittal log prepared by the Submittal Processing Team (SPT). Make revisions as required. Provide periodic reports to the COTR detailing the current status of all submittals, highlighting submittals requiring management attention and proposing appropriate action. When requested, take action as approved by the COTR to assist the construction contractor in satisfying contract submittal requirements.

No. SP2
Review Submittals

Review submittals to determine whether products proposed for use in the construction satisfy contract specifications. Determine (a) whether the submittal package is complete, (b) whether the data provided is sufficient, and (c) whether the products described are acceptable. Fill out the transmittal sheet to indicate proposed action, and process the submittal package per LCMM or as directed in the Additional Instructions. Unless otherwise directed, perform reviews within 10 calendar days of receipt of the submittal package. When recommending disapproval or conditional approval, note the item's objectionable properties and the minimum standards the item must satisfy. Notify PM or COTR in advance of paperwork when submittals are not acceptable.

CONTRACT CHANGE ORDER SUPPORT SERVICES

No. CO1
Process Value Engineering
Change Proposals (VECP's).

Review VECP's submitted by the contractor. Verify that proposals include all information required by FAR 52.248-3, Part (c). Make recommendations regarding the effect of the proposal on the functional capability of the completed facility. Report findings and recommendations to the COTR within 15 days after receipt of VECP.

No. CO2
Process Contractor Requests for Information (RFI's)

Research contract documents and perform field surveys as required to collect requested information. Fax a copy of all incoming RFI's to the project COTR and obtain the COTR's concurrence on responses. Respond to RFI's within 5 calendar days of receipt. If an answer cannot be provided within 5 days, respond with an acknowledgement to the construction contractor advising expected date on which answer will be provided. (Include task No. DM2 w/ this task.)

No. C03
Process Requests for Proposal (RFP's)

Review and develop technical proposals for changing the contract. Present proposals to the project COTR for approval. Draft Emergency Field Directed Changes (EFDC's) and deliver to the COTR within two hours of an oral order. Develop Request for Change (RFC) packages, consisting of a detailed statement of work (SOW), an engineering sketch, and a detailed cost estimate. Deliver RFC packages for changes that involve an EFDC no more than two working days after the EFDC is issued. For proposal, RFP delivery dates are negotiable. Oral order to proceed is COTR's responsibility.

No. C04
Change Order Drafting Services

Provide drafting services, as directed, to document proposed changes in the contract drawings. Civil, mechanical, electrical, structural, and architectural drafting services are anticipated. Tasks will typically involve modifying existing NASA project drawings to reflect engineering information provided by NASA engineers via red-lined contract drawings or sketches. Project drawings in AutoCAD format will be provided. Tasks will ordinarily be completed in five working days. If more than five days will be needed to complete a task, give the COTR a proposed delivery date within two working days of task order receipt.

No. C05

Monitor RFC's in process

Establish and maintain an RFC management control system. Provide a (weekly/biweekly/ monthly) report which summarizes the status of all in-process RFC's. (Include task No. CO3 and task No. DM2 w/ this task.)

PROGRESS MANAGEMENT SERVICES

No. PM1
Review Contractor Progress Schedule Submittals

Review the contractor's progress schedule submittals monthly, and assess the contractor's ability to meet contract completion dates. Evaluate the contractor's current schedule in light of progress thus far, known constraints, and the contractor's recent performance. Where appropriate, propose actions for removing constraints. Report findings and recommendations to the project COTR. Draft cure letter to contractor as directed.

No. PM2
Develop a Government Milestone Schedule

Develop a milestone schedule based on the contractor's approved baseline progress schedule. Monitor attainment of milestones and report dates when milestones are achieved. Update the schedule as appropriate based upon the construction contractor's updated schedule.

No. PM3
Review Contractor Progress Payment Requests

Compare the contractor's progress as shown on validated progress payment requests against the current approved progress schedule and note variances. When actual progress falls behind planned, identify probable causes and recommend corrective action to the COTR.

No. PM 4
Maintain Photographic Records of Job Progress

Compile sets of progress photographs, which document construction. Take one set of photographs shortly before ground breaking. After construction begins, take one set around the 15th of every month, until all construction work is finally completed and delivered. Submit one set of photographs to the project COTR by the 25th of every month.

No. PM5
Prepare Project Coordination Meeting Reports

Review contractor's monthly progress report. Verify the validity of factual information presented. Prepare PCC briefing materials, as enumerated below (See Additional Instructions), based on validated information from the contractor and NASA project team members.

No. PM6
Provide Staff Support

When requested by the COTR, participate in conferences or meetings, called to address schedule, technical or other matters and involving one or more of the following: NASA, the contractor, the designer or other parties. Perform the following services as directed by the COTR: Prepare agendas; perform pre/post-meeting staff work, offer technical opinions and recommendations, prepare and distribute reports, minutes, and action item lists.

No. PM7
Coordinate Supply of GFP

Coordinate the delivery of Government furnished property, (materials and equipment) as specified in the project specifications. Verify the GFP conforms to the specifications, expedite delivery of GFP as directed, facilitate and document the transfer of GFP custody, and facilitate and document return of excess GFP and/or salvaged materials.

DOCUMENTATION MANAGEMENT SERVICES

No. DM1
Manage Contract Correspondence

Produce and maintain a correspondence log. Receive and log all incoming correspondence. Distribute for appropriate action per the guidelines provided below (See Additional Instructions). Send copies of all correspondence to the COTR with a transmittal sheet indicating (1) date received, (2) action assignee/phone number, and (3) action due date. Provide monthly reports listing unanswered correspondence, action due dates, and action assignees. For overdue correspondence, identify interim actions taken to satisfy the originator and provide a revised due date. When directed by the COTR, prepare correspondence for COTR's signature.

No. DM2
Manage RFI's

Produce and maintain an RFI log. Receive and log all incoming RFI's. Assign action based on guidelines provided below (See Additional Instructions). Send copies of all RFI's to the COTR. Provide monthly reports listing unanswered RFI's, action due dates, and action assignees. When response cannot be made within 5 working days, provide a brief explanation of the time required to respond, identify interim actions taken to satisfy the originator, and provide a revised due date. Prepare RFI response for signature by the COTR.

No. DM3
Support Contract Closeout and Work Acceptance

Manage the process leading up to final acceptance of the completed construction and contract closeout as described in Section 3 of the NASA LaRC Construction Management Handbook.

No. DM4
Review Contractor As-built Drawings

Concurrent with other planned or directed visits to the job site, verify that the construction contractor's as-built drawings are maintained up-to-date and reflect work in place as amended by change orders. Verify that Government approved and documented deviations are recorded in the contractor's as-built drawings. Report cases of non-compliance to the COTR. In addition to reviews during the project, review the contractor's as-builts when submitted at the end of the project and verify that all changes are recorded.

No. DM5
Produce As-built Record Drawings

Revise the original contract drawings to reflect changes recorded in the contractor's approved as-built drawings. Unless otherwise indicated in additional instructions below, provide completed drawings within 30 working days.

No. DM6
Documenting Potential Claims

Document potential claims with photographs and daily reports itemizing related costs. Consider all unilateral change orders, Government interference, and situations likely to increase the contractor's cost and/or time of performance as potential claims. Notify the COTR when a potential claim situation arises and solicit guidance as to the type and number of photographs to take. Provide the COTR an accounting of actual costs for potential claims three working days after the additional work is complete. (Include task No.'s DM2, PM1, CO3 w/ this task.)

Check if additional instructions are included.

ADDITIONAL INSTRUCTIONS

Mark if additional pages are attached.

Leave this page blank

SECTION (5)
REFERENCES
NASA Langley Forms and Procedures
http://lms/

FORM NO.	TITLE
LANGLEY FORMS	
LF-251	Inspection Menu of Services
LF-252	Construction Management Services
LF-253	Request for Information
LF-254	Noncompliance Report for Formal Contracts
LF-317	Technical Submittal Form
LF-326	Estimate for Contract Modification
LF-327	Specification Revision
LF-328	RFC Proposal Evaluation
LF-329	Emergency Field Directed Change (EFDC) Order
LF-330	Facility Systems Construction Contract Completion Checklist
LF-331	Facility Systems Project Closeout Checklist
LF-332	Facility Systems Contract Performance Evaluation
LF-337	Facility Systems – Request for Change
ORGANIZATIONAL PROCEDURES	
LMS-OP-5689	Facility Systems Project Management Plan Development
LMS-OP-5691	Facility Systems Bid Package Development
LMS-OP-5692	Facility Systems Procedures for Processing RFC's and EFDC's
LMS-OP-5693	Facility Systems Construction Contract Closeout Process

EXHIBIT O – LANGLEY FORM 252

Construction Management Services
Statement of Work (SOW)
Estimated Project Manhours

Date:		Task No.:

Contract Data

Contract No.: NAS1-	Project Title:		Contractor:
Performance Period (days):	Award Amount:	COTR/PMS:	Contracting Officer:

Preconstruction Services

- ☐ PC1 - Obtain Permits
- ☐ PC2 - Document and Coordinate Responses to Bidders Queries

Submittal Processing

- ☐ SP1 - Produce and Update the Project Submittal Log
- ☐ SP2 - Review Submittals

Contract Change Order Support Services

- ☐ CO1 - Review Value Engineering Change Proposals
- ☐ CO2 - Process Contractor Requests for Information (RFIs)
- ☐ CO3 -Develop Request for Change (RFC) Documents
- ☐ CO4 - Drafting Services

Progress Management Services

- ☐ PM1 - Review Monthly Contractor Progress Schedule Submittals
- ☐ PM2 - Develop A Government Milestone Schedule
- ☐ PM3 - Review Contractor Progress Payment Requests
- ☐ PM4 - Maintain Photographic Records of Job Progress
- ☐ PM5 - Provide Staff Support

Documentation Management Services

- ☐ DM1 - Manage Contract Correspondence
- ☐ DM2 - Manage RFIs
- ☐ DM3 - Acceptance of Completed Work
- ☐ DM4 - Review Contractor As-built Drawings
- ☐ DM5 - Provide As-built Record Drawings
- ☐ DM6 - Document Potential Claims

COMMENTS:

MAN HOURS x RATE ($ / hr) = COST: $

NASA Langley Form 252 (Rev. Oct. 2003) Previous editions are obsolete.

Exhibit C 4.5

Appendix 4.5

Standards and Procedures for FEUD

Standards and Procedures

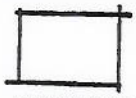
for

Facilities and Utilities Electronic Database (FUED)

Drafting Conventions

Standard CAD Practices

- All lines shall be a continuous entity whenever possible, without short segments.
- All building lines must be parallel or perpendicular to each other. Draw with ORTHO mode ON if possible. Building lines shall also be parallel to streets when applicable.
- Line intersections shall be properly trimmed.

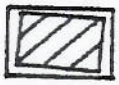


WRONG

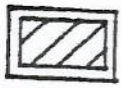
RIGHT

TRIM Command

- Entities shall be properly aligned.



WRONG



RIGHT

OFFSET, FILLET command.

- All arrowheads shall be two feet in size.

Customized Menu

All drawings for FUED project are accomplished using an AutoCAD customized menu which has been specifically designed for FUED.

Drafting standards incorporated in this menu were developed from NASA Drawing Standards Section 5, Civil Drawings.

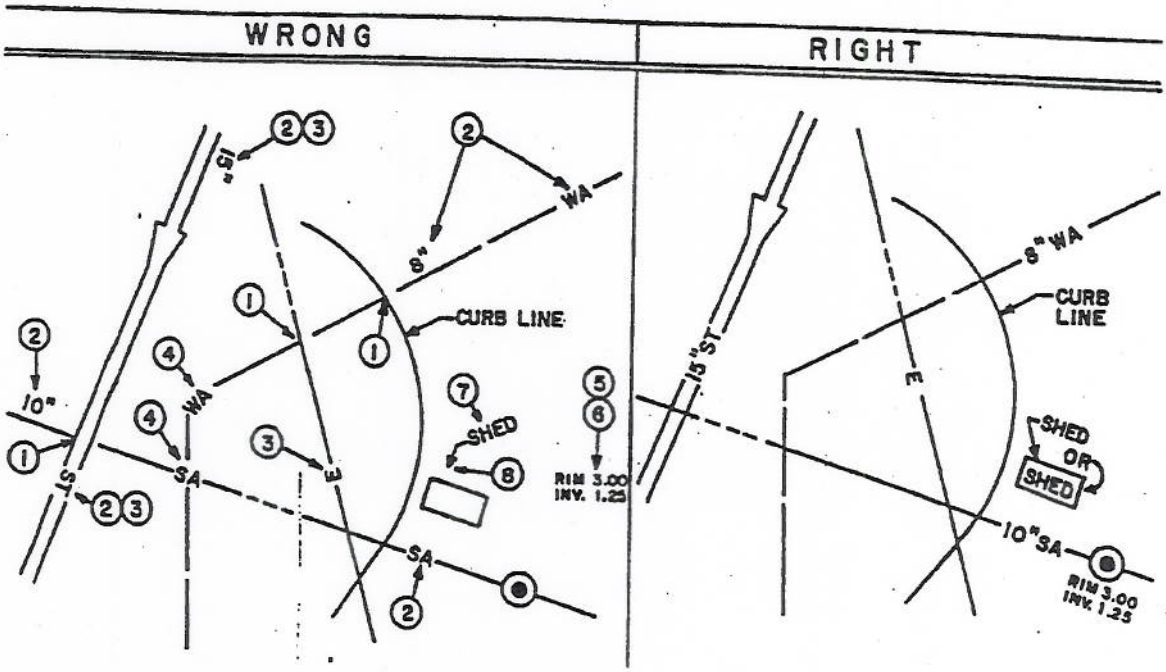
Borders and Title Block which include titles and legends for topo, electrical, and telephone drawings. Borders which include title block must be inserted at location 0,0 after the drawing is completed.

FUED Blocks
Title.dwg
Border.dwg

Blocks

All blocks are entered from tablet; see columns 23, 24, and 24, FUED Overlay. Blocks are drawn at full scale

GRAPHIC PRESENTATION OF THE "RIGHTS" & "WRONGS"



1. The pipeline butts against curb line, another pipeline, and "E" line instead of passing THROUGH. All lines passing across another line, shall be CONTINUOUS at the point of crossing.

2. The system designation ("SA", "WA", "ST") and the pipe size are not together. These designations (system and pipe size) shall be shown adjacent to each other and directly IN THE LINE wherever possible.

3. The designations "E", "15", and "ST" are in the wrong lettering plane, See diagram on page .

4. System designations shall never be shown at the intersection of two lines, nor at a sharp bend in the line.

5. The lettering is too far from the object. Lettering shall always be as close as possible to the object, or leader lines may be used where necessary.

6. The lettering is horizontal with respect to the plan, but it is out of "plane" with its object. Lettering shall be in the same plane as the object wherever possible.

7. The lettering is completely out of plane with the object. The plane of all lettering shall have a definite relationship to some item on the drawing.

8. The arrow fails to touch the object.

General Information

All draftsmanship shall be accomplished with a minimum of damage to the tracings.

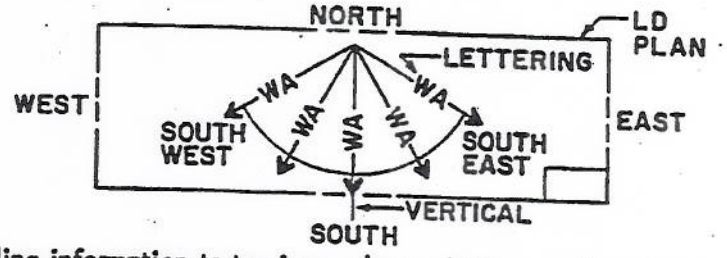
Information shall not extend beyond match lines, unless extenuating circumstances so justify.

In order to provide continuity from one sheet to the next, systems shall be clearly identified as close to the match line as possible.

Care should be taken to make match lines exact.

For ABBREVIATIONS not included in this chapter (see Section 5.5), use MIL-STD-12D. For abbreviations of chemical elements such as Hydrogen, Helium, Nitrogen, etc., use the standard symbols in the table of elements. Abbreviations for new type systems or objects shall not be arbitrarily coined.

All lettering shall be on a plane parallel to the associated object (building, road, pipeline, etc.). If this is not feasible, good judgement shall be used in choosing the plane of lettering. The following sketch exemplifies the direction of lettering on different planes.



When adding information to tracings, place additions so there is no conflict with existing information. Lines shall not be run through lettering. Avoid overcrowding areas and use discretion in placement of lettering.

The nomenclature "L" shall be used in all lighting system lines regardless of whether the line feeds an outdoor light or other devices such as "warning light", "photo-electric cell", "illuminated direction marker", etc.

All cross hatching shall be from lower left to upper right.

Objects shown which cannot be easily identified by configuration shall be labelled so that their identities are apparent.

All topography shall be inked on the reverse side of the mylar. All utilities, above and below grade shall be inked on the front side.

Trailers shall be shown on 1":30' scale Subsurface, Electrical, and Telephone drawings. They will be shown on Systems drawings only if serviced by the system. Trailer complex's with assigned facility numbers and of semi-permanant nature shall be shown on Key Sheets.

In all cases, arrow heads of leader lines shall TOUCH the object being identified except as follows:

A. Where arrow points to a general area.
B. In cases where the nature of the object is such that PENETRATION of the arrow is necessary for proper identification.

Sizes of LEROY guide and pen shall be as specified in Section 5.6. However, smaller size lettering will be permitted where congestion is a problem.

The following is a short list of standard inked items with pen and guide sizes required:

A.	Coordinate lines	000 pen	
B.	Coordinate numbers	0 pen	100 guide
C.	LD number	2 pen	175 guide
D.	Sheet number	0 pen	120 guide

All like symbols shall be the same size. When symbol dimensions are specified and adherence to these dimensions will cause undue congestion on the plan, a reduced size will be acceptable.

On all civil plans, proposed work shall be shown on the tracing in pencil until as- built plans are received, at which time the work will be inked.

Rim and invert elevations for all manholes and catch basins shall be shown. This information is to be located adjacent to the structure. Leader lines may be used in congested areas when necessary.

All telephone and electrical manhole numbers shall be shown.

All paved or gravelled areas shall have type of surface designated.

Air Force buildings and utilities shall be shown on subsurface, electric and telephone plans because of their proximity to NASA buildings. Air Force buildings shall be outlined with no. 0 pen and shall not be hatched. They shall be labelled Air Force. The building number and name shall be included. Air Force utilities shall be shown in the same manner as NASA utilities.

SUBSURFACE

Subsurface drawings are to depict everything encountered in the development of the civil plot plans above and below grade. This includes topography, roads, buildings, structures, utility tunnels, pipelines, electrical lines, telephone and data lines, etc. Electrical and telephone information will be less expansive than that shown on the "Electrical" and "Telephone" plans. For example, electrical, telephone and data cables will not be shown in buildings or utility tunnels on subsurface plans.

The size of the cables and ducts will not be shown on subsurface plans. However, the voltage from 22 KV and up shall be specified.

All layers will be on, except for ELECTRICAL-D and TELEPHONE-D.

ELECTRICAL

Electrical drawings are to depict all topography, roads, buildings, structures, pipelines, or any other lines ABOVE GRADE, all ELECTRICAL lines, utility tunnels, ducts, substations, ELECTRICAL manholes, etc. ABOVE and BELOW grade. High voltage lines (stating KV), cable sizes and number of cables, conduit sizes and any other pertinent ELECTRICAL infomation in utility tunnels, ducts and above the surface, will be shown. When necessary for clarification, electrical lines may be shown within buildings. The emphasis will be on ELECTRICAL information.

Electrical drawings do not show items such as: telephone lines and ducts (except when combined in a duct with electrical lines), pipelines of any kind below the ground, nor manholes for telephone, sanitary or storm systems.

When available all substation numbers shall be supplied on plans.

All layers will be off except the BORDER, GRID, GRID-T, TOPOGRAPHICAL, TOPOGRAPHICAL-T, BUILDING, BUILDING-T, TUNNELS, TUNNELS-T, ELECTRICAL, ELECT-D AND ELECT-STRLGTS.

TELEPHONE

Telephone drawings are to depict all topography, roads, buildings, structures, pipelines, or any other lines ABOVE GROUND. All TELEPHONE lines, ducts, manholes, etc., ABOVE and BELOW grade. Cable sizes and number of cables, conduit sizes and other pertinent TELEPHONE information shall be shown. Utility tunnels shall be shown inside buildings on TELEPHONE plans only if telephone lines are contained therein. When necessary for clarification telephone lines also may be shown within buildings. The emphasis will be on TELEPHONE information.

Show utility tunnels only if TELEPHONE or DATA cables are housed therein.

Telephone plans do not show such items as: electric lines and ducts (except when combined in a duct with telephone lines), pipelines of any kind below the ground, manholes for electric, sanitary, water, steam, compressed air, gas, etc.

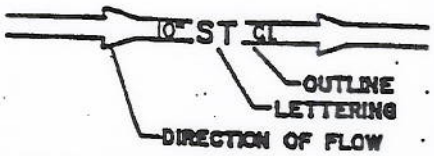
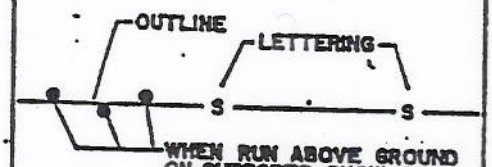
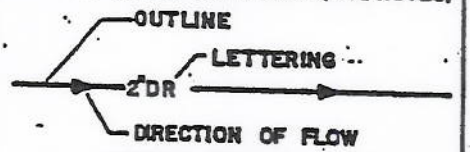
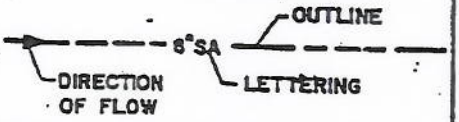
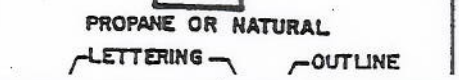
All layers will be off except the TELEPHONE, TELEPHONE-D, GRID, GRID-T, BUILDING, BUILDING-T, TOPOGRAPHICAL, TOPOGRAPHICAL-T, BORDER, TUNNELS and TUNNELS-T.

Text hieghts and pen widths

SYMBOLS

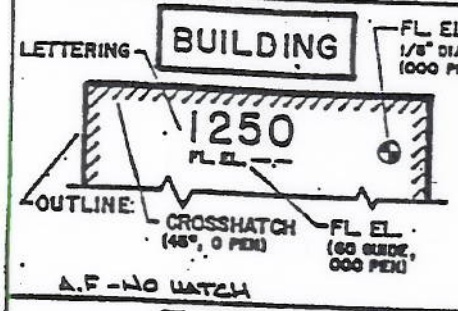
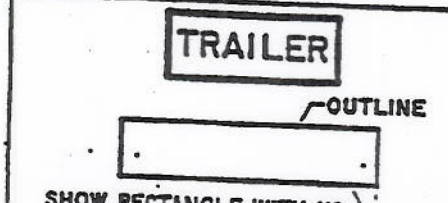
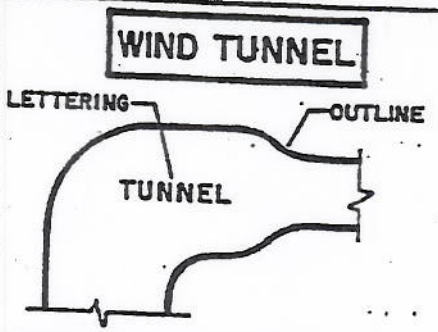
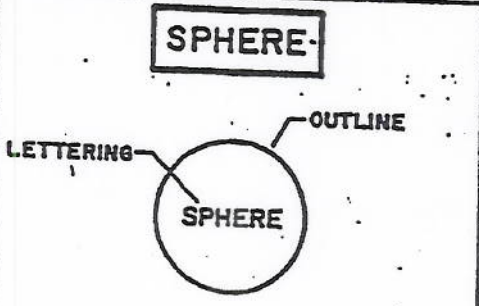
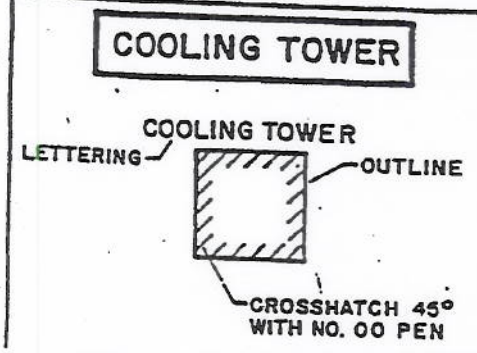
OBJECT	SUBSURFACE			ELECTRICAL			TELEPHONE		
	OUT-LINE	LETTERING		OUT-LINE	LETTERING		OUT-LINE	LETTERING	
	PEN	GUIDE	PEN	PEN	GUIDE	PEN	PEN	GUIDE	PEN
WATER SEE NOTES LETTERING OUTLINE 6"WA	MAGENTA (6) .50	20°	RED(1) .25						
HOT WATER HEATING SYS. Q.L. LETTERING OUTLINE 4"HWH WHEN RUN ABOVE GROUND ON SUPPORTS; SHOW CIRCLES.	MAGENTA (6) .50	20°	RED(1) .25						
COMP. AIR LETTERING OUTLINE 1"AIR 1"AIR SPECIFY PRESSURE IF KNOWN	CYAN(4) .35	20°	RED(1) .25						
PIPE LINE CUT/CAPPED CUT CAPPED	SAME AS UTILITY .25								
VALVE USE 80 LEROY, LETTER X	SAME AS UTILITY .25								
FIRE HYDRANT 5/64" DIA. STREET TYPE BUILDING TYPE (SIAMESE)	(13) .25								
CATCH BASIN LETTERING C.B. 3/32" SQUARE INVT. AND TOP DATA GUIDE 60 PEN 000	(13) .2	2(	RED(1)						

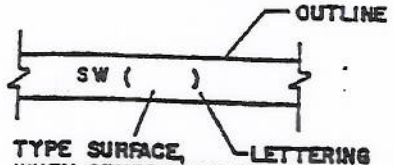
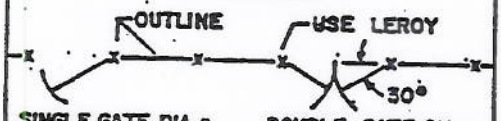
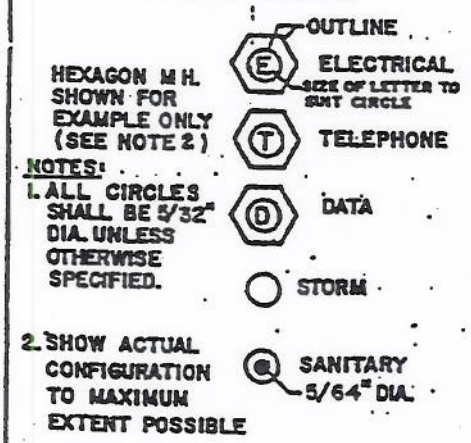
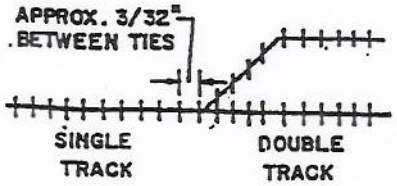
SYMBOLS

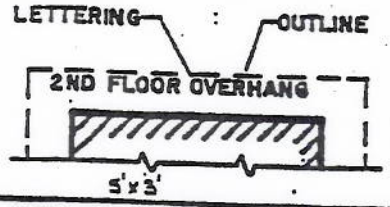
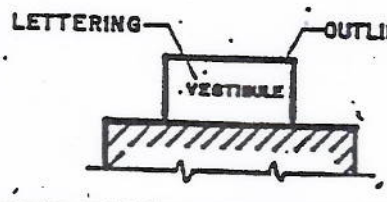
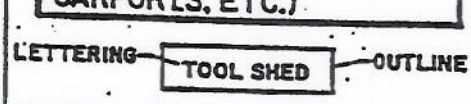
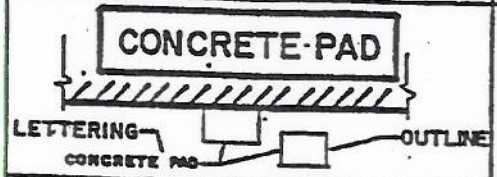
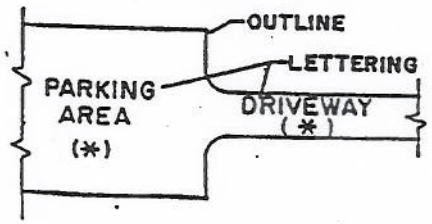
OBJECT	SUBSURFACE			ELECTRICAL			TELEPHONE		
	OUT-LINE	LETTERING		OUT-LINE	LETTERING		OUT-LINE	LETTERING	
	PEN	GUIDE	PEN	PEN	GUIDE	PEN	PEN	GUIDE	PEN
PIPING SYSTEMS									
STORM (SEE NOTE) 	BR—MAGENTA(14) .25	20"	RED(1) .25						
STEAM 	BR—RED(9) .25	20"	RED(1) .25						
DRAIN USE THIS SYMBOL FOR DRAINS CARRYING AWAY CHEMICAL WASTE OTHER THAN NORMAL WATER OVERFLOW. (SEE NOTES)  SPECIFY PURPOSE OF LINE, EXAMPLE: HYDRAZINE WASTE	MAGENTA(6) .50	20"	RED(1) .25						
ALSO USED WHEN WATER IS OTHER THAN FROM SURFACE DRAINAGE (e.g. SUMP DISCHARGE, COND. DRAIN)									
SANITARY 3 SHORT (SEE NOTES) 	MAGENTA(6) .50	20"	RED(1) .25						
GAS PROPANE OR NATURAL 	CYAN (4)		RED(1)						

OBJECT	SUBSURFACE			ELECTRICAL			TELEPHONE		
	OUT-LINE	LETTERING		OUT-LINE	LETTERING		OUT-LINE	LETTERING	
	PEN	GUIDE	PEN	PEN	GUIDE	PEN	PEN	GUIDE	PEN
CABLE OUTDOOR LIGHTING (SEE NOTE 26, PART 4) *L ELECTRIC *E DATA *D TELEPHONE *T L—TWO SHORT, ONE LONG DASH E,D,T—THREE SHORT, ONE LONG DASH IDENTIFY CABLES EVERY 6" (L,T,E,ETC.) OR CLOSER IF NECESSARY	COLOR DEPENDS ON UTILITY .25 EXCEPT 110 KV WHICH SHALL BE .50	20" EXCEPT 110 KV WHICH SHALL BE 24"	COLOR OF TEXT SAME AS LINE COLOR .25 EXCEPT 110KV WHICH SHALL BE .25	00 EXCEPT 110KV WHICH SHALL BE 1	80 EXCEPT 110 KV AND CABLE DESIG. USE 60	000 EXCEPT 110 KV AND CABLE DESIG., USE 000	00	2-1-2 80 EXCEPT CABLE DESIG. WHICH SHALL BE 100	000 EXCEPT CABLE DESIG. WHICH SHALL BE 00
* USE THESE INDICATIONS ONLY ON SUBSURFACE DRAWINGS. ELECTRICAL AND TELEPHONE PLANS SHALL INDICATE ALL OTHER NECESSARY INFORMATION. (FOR 110KV / MAGENTA(6)									
CONDUIT 3/4" CONDUIT LABEL AS "CONDUIT" SPECIFY NUMBER OF CONDUITS AND SIZES FALM: ELEC. 2S DATA: 2S TEL	COLOR DEPENDS ON UTILITY .25	20"	RED(1) .25	00	80	00	00	80	00
UNDERGROUND TANK OUTLINE LETTERING VENT FILLER WATER 2000 GAL. 3 FT. S.S. SPECIFY TANKS USE, CAPACITY AND ELEVATION.	(13) .25	20"	RED(1) .25	—	—	—	—	—	—
SLEEVES WHERE CONDUIT IS USED AS A SLEEVE. OUTLINE (SHORT DASHES) CABLE, PIPE, ETC.	(13) .25	20"	RED(1) .25	00	80	00	00	80	00

OBJECT	SUBSURFACE			ELECTRICAL			TELEPHONE		
	OUT-LINE	LETTERING		OUT-LINE	LETTERING		OUT-LINE	LETTERING	
	PEN	GUIDE	PEN	PEN	GUIDE	PEN	PEN	GUIDE	PEN
PARKING AREA OUTLINE PARKING AREA (CONC) TYPE SURFACE IN PARENTHESIS (GRAVEL, ASPHALT ETC.-USE 80 GUIDE WITH 00 PEN) (2A")	(13) .25	30"	RED(1) .25	00	100	00.	00	100	00
OPEN FIELD	—	100	00	—	120	0	—	120	0
NASA MONUMENT LETTERING 7 OUTLINE 7 SPECIFY NUMBER ELEVATION AND COORDINATE NASA MON. 13 EL. 2.68 N 283,536.24 E 2,616,228.13 60 GUIDE, 000 PEN (2D")	BLUE(5) .25	24"	RED(1) .25	000	60	000	000	60	000
ROAD SHOW A SOLID OUTLINE FOR CONC. AND ASPHALT ROADS AMES ROAD (CONC) JONES ROAD (ASPHALT) SHOW A DASHED OUTLINE FOR DIRT AND GRAVEL ROADS SMITH ROAD (GRAVEL) BLAN ROAD (DIRT) SHOW TYPE OF SURFACE IN PARENTHESIS AFTER ROAD. (80 GUIDE, 00 PEN) A M E S R O A D SPREAD OUT ROAD NAMES WHEN SPACE PERMITS.	(13) .25	60"	WHITE(7) .50	00	140	1	00	140	1
DEMOLISHED BUILDINGS WITH MASONRY AT GROUND LEVEL AND BELOW DEMOLISHED BUILDING MASONRY OUTLINE LETTERING	(13) .25	30"	RED(1) .25	000	80	00	000	80	00

OBJECT	SUBSURFACE			ELECTRIC			TELEPHONE		
	OUT-LINE	LETTERING		OUT-LINE	LETTERING		OUT-LINE	LETTERING	
	PEN	GUIDE	PEN	PEN	GUIDE	PEN	PEN	GUIDE	PEN
 A.F -NO MATCH	WHITE(7) 9 POLY	60°	WHITE(7) .50	3	175	2	3	175	2
 SHOW RECTANGLE WITH NO CROSSHATCHING. LABEL TRAILER OR TRLR	WHITE(7) .50	36°	RED(1) .25	1	100	00	1	100	00
	WHITE(7) 9 POLY	42°	WHITE(7) .50	3	120	0	3	120	0
	WHITE(7) .50	36°	RED(1) .25	1	100	00	1	100	00
	WHITE(7) .50	36°	RED(1) .25	1	100	00	1	100	00

OBJECT	SUBSURFACE			ELECTRIC			TELEPHONE		
	OUT-LINE	LETTERING		OUT-LINE	LETTERING		OUT-LINE	LETTERING	
	PEN	GUIDE	PEN	PEN	GUIDE	PEN	PEN	GUIDE	PEN
SIDEWALK  	(13) .25	24°	RED(1) .25	00	80	00	00	80	00
FENCE  SINGLE GATE DIA.= 2X GATE OPENING. DOUBLE GATE DIA.= GATE OPENING. DIMENSIONS TAKEN FROM CENTER OF X. SHOW ALL GATES IN THE OPEN POSITION. 1" SPACING FOR LARGE ENCLOSURES, USE MULTIPLES OF 1/2" FOR SMALLER ENCLOSURES.	(13) .25	20°	RED(1) .25	000	60	000	000	60	000
MANHOLE  .25		RED(1) .25	0	80 M.H.NO.	00	0	80 M.H.NO.	00
RAILROAD  	(13) .25	24°	RED(1) .25	00	80	00	00	80	00

OBJECT	SUBSURFACE			ELECTRIC			TELEPHONE		
	OUT-LINE	LETTERING		OUT-LINE	LETTERING		OUT-LINE	LETTERING	
	PEN	GUIDE	PEN	PEN	GUIDE	PEN	PEN	GUIDE	PEN
OVERHANG OF ROOFS, UPPER FLOORS AND BALCONIES 	(13) .25	20°	RED(1) .25	00	60		00	60	
ENCLOSED ENTRANCE (VESTIBULE) 	WHITE(7) * 9'POLY	20°	RED(1) .25	*	60	000	*	60	000
	* SAME AS STRUCTURE OUTLINE								
MISCELLANEOUS STRUCTURES (NOT COVERED BY THE PRECEDING, SUCH AS TOOL SHEDS, PICNIC SHELTERS, LUMBER STORAGE AND CARPORTS, ETC.) 	WHITE(7) .50	30°	RED(1) .25	0	80	00	0	80	00
CONCRETE PAD 	(13) .25	20°	RED(1) .25	000	60	000	000	60	000
PARKING AREA AND DRIVEWAY 	(13) .25	30°	RED(1) .25	00	80	00	00	80	00

* IDENTIFY TYPE OF SURFACE ASPHALT, CONC., etc.

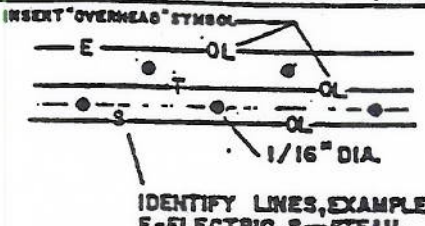
SYMBOLS

OBJECT	SUBSURFACE			ELECTRICAL			TELEPHONE		
	OUT-LINE	LETTERING		OUT-LINE	LETTERING		OUT-LINE	LETTERING	
	PEN	GUIDE	PEN	PEN	GUIDE	PEN	PEN	GUIDE	PEN
DUCT DEPENDS ON COLOR OF DUCT 3/32" WIDE, LETTERING, OUTLINE, E, * SHADE LIGHTLY ON BACK SIDE (PENCIL) INDICATE TYPE OF SYSTEM EVERY 6" (E,T,D ETC.) SEE PARA. 2 AND 3 OF PART 4	.25	24°	RED(1) .25	00	80	00	00	80	00
* USE IDENTIFICATION SHOWN ONLY ON SUBSURFACE PLANS. ELECTRICAL AND TELEPHONE PLANS SHALL IDENTIFY THE NUMBER OF DUCTS. "4D","6D" ETC.									
UTILITY TUNNEL 1/4" WIDE, OUTLINE, LETTERING UTILITY TUNNEL 1/16", 1/2", SPREAD OUT LETTERING STAGGER DASHED LINES SHOW UTILITY TUNNELS INSIDE BLDG. ON TELEPHONE DRAWINGS ONLY.	BROWN(10) .25	30°	RED(1) .25	0	120	0	0	120	0
VACUUM DUCT 3/16" WIDE, LETTERING, OUTLINE VACUUM DUCT SHOW WITH DASHED LINES IF BELOW SURFACE, SOLID LINES IF ABOVE SURFACE	(13) .25	24°	RED(1) .25	0	80	0	0	80	0
HATCH VENT 45° WITH 000 PEN, OUTLINE, HATCH, VENT, LETTERING HATCHES WILL BE SHOWN ON ALL PLANS SHOWING UTILITY TUNNELS. ONLY UTILITY HATCHES WILL BE SHOWN.	(13) .25	20°	RED(1) .25	00	60	000	00	60	000
DITCH, SWALE OR INTERMITTENT STREAM LESS THAN 3 FT IN DEPTH	(13)			000			000		

1" = 30'

OBJECT	SUBSURFACE			ELECTRICAL			TELEPHONE		
	OUT-LINE	LETTERING		OUT-LINE	LETTERING		OUT-LINE	LETTERING	
	PEN	GUIDE	PEN	PEN	GUIDE	PEN	PEN	GUIDE	PEN
ON STORM LAYER — DITCH (3 FT. AND OVER IN DEPTH) — POINT ARROW IN DIRECTION OF FLOW — 000 PEN — OUTLINE — * DRAW TO SCALE — SMALL DITCH - TOPO	(13) .25	20°	RED(1) .25	00	80	00	00	80	00
EMBANKMENT — OUTLINE — TOE OF SLOPE — LETTERING — * DRAW TO SCALE	(13) .25	20°	RED(1) .25	00	80	00	00	80	00
WOODED AREA — OUTLINE — LETTERING — WOODS	(13) .25	30°	RED(1) .25	00	100	00	00	100	00
MARSH — LOWER CASE LETTERING — OUTLINE — Marsh	(13) .25	30°	RED(1) .25	000	100	00	000	100	00
NASA PROPERTY LINE — LETTERING — OUTLINE — NASA — PROPERTY — LINE — 3/16" — 2 1/2" — 1/16"	WHITE(7) 5'POLY	60°	WHITE(7) .50	2	175	2	2	175	2
HEDGE — LETTERING — OUTLINE — HEDGE — INKED ON REVERSE SIDE OF DRAWING	(13) .25	30°	RED(1) .25	000	60	000	000	60	000

SYMBOLS

OBJECT	SUBSURFACE			ELECTRIC			TELEPHONE		
	OUT-LINE	LETTERING		OUT-LINE	LETTERING		OUT-LINE	LETTERING	
	PEN	GUIDE	PEN	PEN	GUIDE	PEN	PEN	GUIDE	PEN
OVERHEAD LINES (ON POWER POLES OR PIPE SUPPORTS) PIPING, ELECTRIC, AND TELEPHONE									
	(13) .25	20°	RED(1) .25	000	60	000	000	60	000
STEAM DUCT 	BR—RED(9) .25	20°	RED(1) .25						
GRASS		24"			Ec	CO		Bc	CO
AUTO CAD TEXT STYLE WILL BE SIMPLEX.									
LOCAL NOTES		24"							
EL. CALL OUTS		24"							
TOP, RIM, AND INVT. CALL OUTS		24"							
GATE NUMBERS AND GATE HOUSES		120							

OBJECT	SUBSURFACE			ELECTRIC			TELEPHONE		
	OUT-LINE	LETTERING		OUT-LINE	LETTERING		OUT-LINE	LETTERING	
	PEN	GUIDE	PEN	PEN	GUIDE	PEN	PEN	GUIDE	PEN
MISCELLANEOUS SYMBOLS									
STREET LIGHT LETTERING C-16 ✳ 1/16" DIA.	GREEN (3) .25	20°	RED(1) .25	000		-	00		
FLOOD LIGHT ✳ 1/8" DIA.	(13) .25	20°	RED(1) .25	00	.80	00	00	.80	00
WARNING LIGHT 240 LEROY FIGURE X ⋈ 5/64" DIA.	(13) .25	20°	RED(1) .25	00	80	00	00	80	00
SIREN 3/32" SQ 45° x 1/16"	(13) .25	20°	RED(1) .25	00	80	00	00	.80	00
TRANSFORMER XFMR	(13) .25	20°	RED(1) .25	00			00		
GUY WIRE & ANCHOR GUY WIRE, POLE-5/64" DIA., ANCHOR-5/64" DIA. SEMI-CIRCLE	(13) .25	20°	RED(1) .25	000	60	000	000	60	000

ABBREVIATIONS - CIVIL DRAWINGS

ABAND.	Abandoned
ACET.	Acetylene
A.F.	Air Force
A.G.	Above Grade
ALM.	Warning Alarm Visual or Audible
APPROX.	Approximately
B.CLG.	Below Ceiling
B.G.	Below Grade
℄	Base Line
BLDG.	Building
B.M.	Bench Mark
C.B.	Catch Basin
C.I.	Cast Iron
℄	Center Line
C.M.P.	Corrugated Metal Pipe
CND.	Conduit
C.O.	Cleanout
CONC.	Concrete
C.T.	Cooling Tower
CU	COPPER
CNDS	CONDENSATE

C.W.	Cold Water
C.W.R.	Cooling Water Return
C.W.S.	Cooling Water Supply
D.	Data
D.I.	DUCTILE IRON
DN.	Down
DR.	Drain
D.S.	Down Spout
E.	Electric
E.D.	Existence Doubtful
EL.	Elevation
EXIST.	Existing
FDN.	Foundation
F.H.	Fire Hydrant
FL.EL FIN.FL.	Finish Floor Elevation
FL.	Floor
F.M.	Force Main
FBR OPT	FIBER OPTIC
G.	Gas
G.I.	Galvanized Iron
G.M.	Galvanized Metal

ABBREVIATIONS - CIVIL DRAWINGS (CONTINUED)

H.	High
H.H.	Hand Hole
H.P.	High Pressure
H.P.C.R.	High Pressure Condensate Return
H.P.S.	High Pressure Steam
HTG.	Heating
H.W.	Head Wall
H.W.H.	Hot Water Heating System
H.W.L.	Hotwell
H.W.S.	Hotwater Supply
H.W.R.	Hot water Return
INV.	Invert
L.	Street Lighting
L.P.	Low Pressure
M.H.	Manhole
MON.	Monument
O.L.	Overhead Lines
P.	Pipe
P.D.	Position Doubtful
P.I.	Point of Intersection
P.I.V.	Post Indicator Valve
PLAT.	Platform
PLST.	Plastic
P.R.	Steam Condensate Pump Return
PROB.	Probable
R.C.	Reinforced Concrete
PCP	REINFORCED CONC PIPE
R.D	Roof Drain
S.	Steam
SA.	Sanitary
ST.	Storm
S.W.	Sidewalk
T.	Telephone
T.C.	Terra Cotta
TNL.	Tunnel
T.P.	Top of Pipe
TR.	Trench
TRANS.	Transformer
TRLR.	Trailer
U.	Underground
V.C.	Vitrified Clay
W.	Wide
WA.	Water

8. Layer Names and Colors

- T indicates text layer
- D indicates detail layer

Layer	Color
Border	White (7)
Title	Red (1)
Grid	Blue (5)
Grid-T	Red (1)
Schedules	Red (1)
Abandoned	Blue (1)
Revisions	Cyan (4)
Const-1	Green (3)
Const-2	Green (3)
Building	White (7)
Building No.	White (7)
Topographical	Br-Blue (13)
Topographical-T	Red (1)
Ungdtopo	Grey (8)
Ungdtopo-T	Red (1)
Tunnels	Brown (10)
Tunnels-T	Red (10)
Electrical	Br-Green (11)
Electrical-T	Red (1)
Elect-Strigts	Green (3)
Elect-D	Br-Red (9)
Telephone	Yellow (2)
Telephone-T	Red (1)
Telephone-D	Br-Red (9)
Data	Cyan (4)
Data-T	Red (1)
Video	Cyan (4)
Video-T	Red (1)
Water	Magenta (6)
Water-Hydrants	Magenta (6)
Water-Valves	Magenta (6)
Water-T	Red (1)
Sanitary	Magenta (6)
Sanitary-T	Red (1)
Storm	Br-Magenta (14)
Storm-T	Red (1)
Gas	Cyan (1)
Gas-T	Red (4)
Air	Cyan (4)
Air-T	Red (1)
Steam	Br-Red (9)
Steam-T	Red (1)
Cooling	Br-Blue (13)
Cooling-T	Red (1)
Telephone-D	Br-Red (9)
Elect-D	Br-Red (9)

EXHIBIT Q - ELEVATORS BY BUILDING LOCATION

LOCATION	EQUIP #	LARC ID	DESCRIPTION
644+FAC	ELV00033	150034	ELEVATOR/PERSONNEL (BLDG 646-100C)
645A-100A	ELV00034	140041	ELEVATOR/PERSONNEL
647-100B	ELV00035	120047	ELEVATOR/FREIGHT
648-100	ELV00010	190007	ELEVATOR/PERSONNEL (HYDRAULIC 2500 LB)
648-100	ELV00010	190007	ELEVATOR/PERSONNEL (HYDRAULIC 2500 LB)
1146+FAC	ELV00012	220013	ELEVATOR/PERSONNEL (NEXT TO RM 106)
1146-111	ELV00013	220072	ELEVATOR/FREIGHT
1152+FAC			ELEVATOR/PERSONNEL (HYDRAULIC 2500 LB)
1192-128	ELV00004	520235	ELEVATOR/PERSONNEL
1194-100	ELV00005	300117	ELEVATOR/PERSONNEL
1194-101	ELV00006	300033	ELEVATOR/PERSONNEL
1195+FAC			ELEVATOR/PERSONNEL (HYDRAULIC 2500 LB)
1195C+FAC	ELV00011	330012	ELEVATOR/PERSONNEL (REAR ENTRANCE)
1202-121	ELV00007	750001	ELEVATOR/PERSONNEL
1205+FAC	ELV00014	760163	ELEVATOR/PERSONNEL
1208+FAC	ELV00036	970224	ELEVATOR/PERSONNEL (ENTRANCE)
1212-142	ELV00015	430036	ELEVATOR/FREIGHT (BACK RAMP)
1212C+FAC	ELV00016	430511	ELEVATOR/PERSONNEL (IN RM 109 208 AND 301)
1215-106	ELV00017	410049	ELEVATOR/PERSONNEL
1216+FAC			ELEVATOR/PERSONNEL (HYDRAULIC 2500 LB)
1219-125	ELV00008	370008	ELEVATOR/PERSONNEL
1219-125	ELV00008	370008	ELEVATOR/PERSONNEL
1220-130	ELV00001	490167	ELEVATOR/FREIGHT (BACK OF AIR LAB)
1230+FAC	ELV00018	470025	ELEVATOR/FREIGHT (NEAR MAIN ENTRANCE)
1230+FAC	ELV00019	470245	ELEVATOR/FREIGHT (NEAR INST LOAN POOL)
1230B+FAC	ELV00020	470220	ELEVATOR/PERSONNEL (HALL BY RM 182)
1232+FAC	ELV00021	550036	ELEVATOR/PERSONNEL (NEAR REST ROOM 109)
1236-122	ELV00022	590501	ELEVATOR/FREIGHT (SHOP)
1236-136	ELV00023	590030	ELEVATOR/PERSONNEL
1244C+FAC	ELV00024	600711	ELEVATOR/PERSONNEL (NEAR RM 164)
1247A+FAC	ELV00025	650010	ELEVATOR/PERSONNEL (HALLWAY 1ST FLR)
1251+FAC	ELV00003	500300	ELEVATOR/FREIGHT (NEAR RM 132)
1251+FAC			ELEVATOR/PERSONNEL (HYDRAULIC 2500 LB)
1268-1090	ELV00026	700090	ELEVATOR/PERSONNEL (HALL NEAR RM 1090)
1268A+FAC	ELV00027	700092	ELEVATOR/PERSONNEL (HALL NEAR RM 1183)
1268C+FAC	ELV00028	700750	ELEVATOR/PERSONNEL (ACROSS FROM RM 1335)
1268C-1323	ELV00029	700789	ELEVATOR/PERSONNEL (CONTROL MECH EQUIP RM)
1293A-123	ELV00031	620169	ELEVATOR/PERSONNEL (2 MAN)
1293C+FAC	ELV00030	620461	ELEVATOR/PERSONNEL (IN HALL BESIDE RM 149)
1295+FAC	ELV00009	2500695	ELEVATOR/PERSONNEL (BESIDE RM 102)
1297G+FAC	ELV00002	710001	ELEVATOR/PERSONNEL (GANTRY)
1297G+FAC	ELV00002	710001	ELEVATOR/PERSONNEL (GANTRY)
1299-120	ELV00032	730001	ELEVATOR/PERSONNEL

EXHIBIT R - CURRENT & PROJECTED CONSTRUCTION SUPPORT

Insp. = Inspection CM=Construction Management

Task Type	Description	Construction Cost Est.	Active/% Complete	Projected Start
Insp.	Construct Integrated Test Facility	$1,450,000	86%	
Insp.	Preclean Room, B1250	$938,000	23%	
Insp.	Construct Model Prep/Storage & Data Processing Rms, ERT	$1,425,000	40%	
CM	Construct Model Prep/Storage & Data Processing Rms, ERT	$1,425,000	40%	
Insp.	Mod Vacuum System, Hypersonic Facilities Complex	$1,405,000	10%	
Insp.	Mods to Instrument Research Lab, B1230	$416,000	95%	
CM	Mods to Instrument Research Lab, B1230		95%	
Insp.	Replace SCRAMJET 20MW DC Power Supply, B1247B	$3,600,000	30%	
Insp.	Replace 1D Transformer at B642 and Air Switches at B1233	$840,000	10%	
Insp.	Mods to 20" Mach 6 CF4 Heater, B1275	$4,700,000	22%	
Insp.	Rehab of Buildings 1250 and 1250A	$2,400,000	70%	
CM	Rehab of Buildings 1250 and 1250A	$2,400,000	70%	
Insp.	Repairs to Air Conditioning Systems B1268	$675,000	5%	
CM	Repairs to Air Conditioning Systems B1268	$675,000	5%	
Insp.	Hangar Fire Suppression System, B1244	$1,850,000	10%	
CM	Hangar Fire Suppression System, B1244	$1,850,000	10%	
Insp.	Facility Expansion at Trash Burning Facility B1288	$900,000	40%	
Insp.	Repairs to Air Conditioning Systems, B1230/1236 **(2 IFBs)**	$3,200,000		April 2004
CM	Repairs to Air Conditioning Systems, B1230/1236 **(2 IFBs)**	$3,200,000		April 2004
Insp.	Rehab of Air Conditioning Systems, B1148, B1168 and B1298 **(2 IFBs)**	TBD		May 2004
CM	Rehab of Air Conditioning Systems, B1148, B1168 and B1298 **(2 IFBs)**	TBD		May 2004
Insp.	Construct Addition to Child Development Center, B1231	Out for Bids		April 2004
CM	Construct Addition to Child Development Center, B1231	Out for Bids		April 2004
Insp.	Mods NTF for Air Enhancements, B1236	Out for Bids		April 2004
Insp.	ADA Upgrades, Various Facilities	Out for Bids		April 2004
CM	ADA Upgrades, Various Facilities	Out for Bids		April 2004
CM	Upgrade HIRF and SAFETI Labs	Out for Bids		April 2004
Insp.	Roll Coupling for 14-x22-Ft.	Out for Bids		April 2004
Insp.	Upgrade Low-Speed Anechoic Tunnel, B1221	Out for Bids		April 2004
CM	Upgrade Low-Speed Anechoic Tunnel, B1221	Out for Bids		April 2004
Insp.	Upgrade Communication Closets, Var. Fac.	Out for Bids		April 2004
Insp.	Upgrade Security of LaRC's Infrastructure	Out for Bids		April 2004
Insp.	14-X22-Ft. Automation System Upgrade, B1212C	Out for Bids		April 2004
Insp.	Repair/Replacement of 350 psig Steam Line Utility Tunnel #4	$8,000,000		June 2004
Insp.	Replace Electrical Substation, 1247F	Out for Bids		June 2004
Insp.	B1195 Elevator	$90,000		July 2004
CM	Mod Reclaimer System, 20-In. CF4 Tunnel, B1275	TBD		TBD
Insp.	HVAC Maintence Repairs/Replacements	varies	active	
Insp.	Electrical Maintence Repairs/Replacements	varies	active	
Insp.	Roofing Maintence Repairs/Replacements	varies	active	
Insp.	General Maintence Repairs/Replacements	varies	active	

EXHIBIT S - INSPECTION TASK ORDER ESTIMATE (SAMPLE)

TASK NO:
TITLE:
BLDG.
TPE:

Inspection Activity	Regular Hours	O/T Hours	X-Ray Hours	Negotiated Hours	Level of Inspection	Date / Initial
Administrative / General Requirements	0	0	0	0		
Administrative:						
Administrative Support						
Task Manager						
Lead Inspector:						
Site Visit / Pre-Con						
Processing Pictures						
Documentation						
Processing Payroll / Invoices						
Technical Project Site Meetings						
Project Planning (Submittal & Drawing Review)						
Work List / Punch List						
Project Closeout						
Permits:						
Digging						
Hotwork						
Work						
Red-Tag / Utility Outage Coordination						
Safety Requirements:						
Housekeeping						
Briefing						
Crane Certificates						
Scaffolding						
Site Safety Coordination						
TOTAL =	0	0	0	0		
Division 2 - Site Construction	0	0	0	0		
Critical Inspection Points: (as follows)						
TOTAL =	0	0	0	0		
Division 3 - Concrete	0	0	0	0		
Concrete Pipe Supports					(2) Point Inspection	
Critical Inspection Points: (as follows)						
TOTAL =	0	0	0	0		
Division 4 - Masonry	0	0	0	0		
Critical Inspection Points: (as follows)						
TOTAL =	0	0	0	0		
Division 5 - Metals	0	0	0	0		
Structural Steel					(2) Point Inspection	
Critical Inspection Points: (as follows)						
TOTAL =	0	0	0	0		
Division 6 - Woods and Plastics	0	0	0	0		
Critical Inspection Points: (as follows)						
TOTAL =	0	0	0	0		
Division 7 - Thermal and Moisture Protection	0	0	0	0		
Critical Inspection Points: (as follows)						
TOTAL =	0	0	0	0		
Division 8 - Doors and Windows	0	0	0	0		
Critical Inspection Points: (as follows)						
TOTAL =	0	0	0	0		
Division 9 - Finishes	0	0	0	0		
Coatings for Steel	5				(2) Point Inspection	
Critical Inspection Points: (as follows)						
TOTAL =	5	0	0	0		
Division 10 - Specialties	0	0	0	0		
Critical Inspection Points: (as follows)						
TOTAL =	0	0	0	0		

EXHIBIT S - INSPECTION TASK ORDER ESTIMATE (SAMPLE)

Division 11 - Equipment	0	0	0	0		
Critical Inspection Points: (as follows)						
TOTAL =	0	0	0	0		
Division 12 - Furnishings	0	0	0	0		
Critical Inspection Points: (as follows)						
TOTAL =	0	0	0	0		
Division 13 - Special Construction	0	0	0	0		
Critical Inspection Points: (as follows)						
TOTAL =	0	0	0	0		
Division 14 - Conveying Systems	0	0	0	0		
Critical Inspection Points: (as follows)						
TOTAL =	0	0	0	0		
Division 15 - Mechanical	0	0	0	0		
General Mechanical Provisions	0		0		(3) Methods Inspection	
Mechanical Welding	0				(3) Methods Inspection	
Piping Insulation	0				(3) Methods Inspection	
Critical Inspection Points: (as follows)						
TOTAL =	0	0	0	0		
Division 16 - Electrical	0	0	0	0		
Critical Inspection Points:(as follows)						
TOTAL =	0	0	0	0		

	Regular Hours	O.T. Hours	X-Ray Hours	Neg. Hours
TOTAL PROJECT HOURS =	0	0	0	0

Comments :
This estimate is based on the amount of work requested in the Menu of Services.

DATE;

Level of Inspection:

(1) ***Acceptance Inspection*** - inspection of the finished product without significant attention paid to the installation process. Acceptance inspection includes verifying materials prior to installation, verifying test results, and conducting final inspections of the finished work.

(2) ***Point Inspection*** - verification of workmanship at established milestones as noted in the plans and specs. It also includes rough-in and phase inspections of the type which precede an "Okay to cover" order. Examples: between paint coatings, rough-ins, and fabrication fit-ups.

(3) ***Methods Inspection*** - verification of construction procedures and methods employed by the contractor and his tradesman with specified practice. Examples: Placing structural concrete, process piping and steel fabrication, and erection of structural masonry.

(4) ***Full Time Inspection*** - inspection support whenever the contractor is actively working. Examples: high voltage splicing, air balance/control set-up work.

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